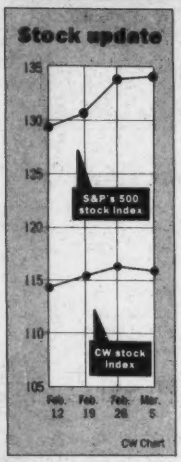
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

# COMPUTERWORLD

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**Recent success** makes Zenith Data Systems even more dependent on government contracts, but the company expects its commercial market to open up. **Page 134.**

■

**It may be years** before the benefits of compact disk read-only memory technology filter into MIS. **Page 8.**

■

**Grid Systems Corp. offers a new screen**, while Morrow Designs now sells a hard disk with its laptop. **Page 10.**

■

**The long wait for a PCM clone** of IBM's 3480 cartridge tape device may be over. **Page 5.**

■

**Because of possible malfunctions**, IBM is exchanging some 72M-byte hard disks sold with its banking processors. **Page 39.**

■

**Lotus' 1-2-3 was not part of the bidding** for the $242 million Air Force contract recently awarded to Zenith Data Systems. If it had been, it would have been rejected, according to Harold Arthur, Air Force project manager for the contract. The Air Force will not accept copy-protected software, claiming it could interfere with the nature of its business.

■

**In a move apparently aimed at speeding installations of DB2**, IBM offers purchasers six months of free use of the relational data base management system and associated tools, *Computerworld* learned last week. IBM confirms it is giving buyers a "six-month monthly license charge allowance that may be applied to the initial license charge." A buyer could skip six $2,675 monthly payments for DB2 or forgo the $16,050 initial license charge.

■

**In other software pricing moves**, Applied Data Research, Inc. last week restructured pricing for its entire product line. ADR, which recently was acquired

See **NEWS** page 4

# Budget cuts trigger COS policy stand

**By Mitch Betts**

WASHINGTON, D.C. — The unlikely issue of proposed federal budget cuts is expected to prompt the fledgling Corporation for Open Systems to take its first stand on a public policy dispute this week.

The COS, a consortium of vendor and user firms, will join with two computer industry trade groups in condemning the Reagan administration's proposal to chop in half the National Bureau of Standards' computer research and standards organization, according to government and industry sources. The COS, the sources said last week, wants to dispel the notion that its activities can supplant the activities of the NBS group.

The Reagan administration's budget proposal for fiscal 1987, which begins Oct. 1, earmarks $5 million for the NBS Institute for Computer Sciences and Technology, a cut of nearly 50% from previous appropriations. The institute prepares guidelines for federal DP managers and works on the development of standards such as the International Standards Organization's Open Systems Interconnect.

Justifying the budget cut, Raymond G. Kammer, deputy director of the NBS, said at a recent briefing that the notion that the government could be a trendsetter in computing — one reason for the creation of the Institute for Computer Sciences and Technology — is no longer valid. Furthermore, he said the Reagan administration had observed that the computer industry is financially healthy, even rich, and does not need government help.

Kammer said that if reduced, the institute would focus only on OSI, computer security and some international standards activity.

The computer industry strongly sup-

See **BUDGET** page 6

# LISP systems tied to SNA

## Symbolics units access IBM mainframe data

**By Elisabeth Horwitt**

CAMBRIDGE, Mass. — Seeking to link its LISP-based artificial intelligence systems to mainframe data processing environments, Symbolics, Inc. last week introduced a product providing two-way data communications through IBM's Systems Network Architecture.

The SNA Facility link, a hardware and software package scheduled for availability in May, connects IBM mainframes to the Symbolics 3600 series of symbolic processing systems through SNA. "It is not *the* step, but it is certainly one step toward integrating the LISP and MIS environ-

See **LISP** page 13

# Sperry action angers users

**By Clinton Wilder**

Owners of Sperry Corp. mainframes, angry and perplexed by the vendor's recently revised software licensing policy, predict the action will backfire and turn away potential customers.

Although Sperry's recently announced software charges are directed at the third-party market, users told *Computerworld* that the immediate impact will be a reduction in the resale value of their machines. "They are trying to be a monopoly in the Sperry world, and they can't afford that," says Ernest Owens, DP director for the New York City Fire Department. "There

See **SPERRY** page 4

**CW EXCLUSIVE**

# *Safe deposit: Manny Hanny confronts DASD challenge*

**By James Connolly**

Wall Street is bullish on growth — growth in revenues, in profits and in the Dow Jones industrial average.

But there is one area where growth is not always good news for Wall Street — the computer room. This is the case particularly when computer room growth means more processing power and a widening expanse of disk drives.

One Wall Street-area business that is implementing measures to control DASD growth is Manufacturers Hanover Trust Co., the fourth largest banking company in the U.S.

MIS managers acknowledge that managing DASD is a challenge, one that becomes tougher each year because of industrywide DASD capacity growth rates of up to 50%, as IBM and independent observers estimate.

Senior technical officer William J. Huebsch says that Manufacturers Hanover, which operates five major data centers in lower Manhattan with each center running multiple IBM 3080-class processors, set out to improve DASD management. This move came after officials noticed that disk storage ate up 25% of their 1984 hardware budget, that disk capacity grew by a 60% compounded annual rate between 1980 and 1985 and that capacity is expected to keep expanding at the same rate. In addition, the use of disks was less than 70%.



Huebsch

Even though Manufacturers Hanover's DASD statistics approximated industry norms, the bank wanted to take a closer look at how disk storage was managed and to develop a management plan that would get the best use out of that 60% growth.

The bank's Computer Technical Services Department completed a pilot study of one data center last year, realized some immediate gains in efficiency and is now implementing guidelines based on what it learned from other data centers.

See **MANNY** page 15

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NEWSPAPER

# IBM's recent price moves heat debate over used 3080s

**By James Connolly**

ANALYSIS

The restructuring of IBM's 3090 and 4381 families of processors a month ago did more than create interest in new members of those mainframe and superminicomputer lines. It heightened the debate about the value of buying new 3090s and new 4381s or used 3080 mainframes.

The debate pits IBM, promoting its new 3090s, against leasing companies, who promote the used 3080s that they often sell after leases expire. Analysts air mixed views, with several asserting that under the right conditions, a used 3080 selling at 30% to 40% of the original list price can meet a user's needs.

"It is interesting. There seems to be a mixed reaction in the marketplace. There are those people who say the 3080 is going to fall off a cliff. But then I see other guys who say that if they could get a 3080 today, they would jump at the chance," reports International Data Corp. analyst Charles Greco, who follows IBM and the leasing industry. Greco notes that used computer prices often fall to a point where "they are just too good to pass up."

Greco says it is unclear whether IBM's Feb. 11 announcement of the uniprocessor Models 150 and 180 for the 3090 line, the replacement of the 4381 intermediate processor line and 10% price cuts for the 3090 Models 200 and 400 has had an impact on used 3080 prices. He says that values of 3080s had been dropping steadily, at a rate of about two percentage points per month, prior to the announcement. But he predicts that wholesale values, the price a user could expect if he were selling a system, will hold steady until at least June. A typical wholesale price is $1.3 million for a 3081 Model K with 32M bytes of memory and 24 channels, Greco says.

### Market awaiting 3090 enhancement

Several observers say the used market is awaiting a 3090 enhancement that clearly sets it apart from the 3080 in the same way that the introduction of IBM's MVS/XA differentiated the 3080 from its predecessor, the 3030.

"Customers are looking at machines based upon their own business requirements. If they do not need what the 3090 now offers and they can get a two- or three-year deal on a 3080, they might be willing to wait for a used 3090," says Robert A. Bardagy, senior vice-president for Comdisco, Inc., an Illinois computer leasing company. Comdisco claims to have been selling an average of at least one 3080 per day as equipment leases expire.

Bardagy says low-end 3080s such as the 3083 Model E are now worth slightly less than 30% of their original list price, while high-end machines such as the 3081 Model K and 3084 Model Q are worth more than that. He notes that the low-end 3080 systems crept down in value in reaction to the 4381 restructuring and that larger systems gained slightly after Feb. 11.

Bardagy and Greco agree that 3090 enhancements are likely by midyear. Bardagy also predicts that IBM, which already advanced the Model 400's scheduled delivery from mid-1987 to late 1986, will make that high-end system available as early as June or July in order to collect several months' worth of Model 400 revenue during the 1986 fiscal year.

### Demand for 3090s strong

But IBM spokesman Ron Barker says, "Demand for the 3090s continues strong. We think they are good products. As far as we are concerned, there has been no softening of the market. The orders continue to be strong. The first-day orders for the Models 150 and 180 were excellent."

Yankee Group analyst Thomas Henkel concurs with Greco that the decision on whether to buy a new 3090 or a used 3080 depends upon the customer's needs. "It depends on their growth. If I am one of those people whose business is growing at 40% or more, I would not go for a 3080. But if I am not in that group, I would have to think about it. The 3080 is a good machine; it works just fine," he says.

Analyst Robert Djurdjevic of Annex Holdings Corp. adds that the basic differences between the 3080 and 3090 today are the expanded storage option and a vector processing facility. He says there remain many users who do not need those features.

"There are good indications that IBM is well into selling 3090s into second-tier companies. For a company like IBM, its first 500 or so mainframes are spoken for before deliveries start. Now they are getting down to the companies to whom differentiation between the 3080 and 3090 becomes important," Djurdjevic says. He adds that if the Model 200 and Model 180 do not sell well by July, IBM will offer added features, most likely faster channel speeds.

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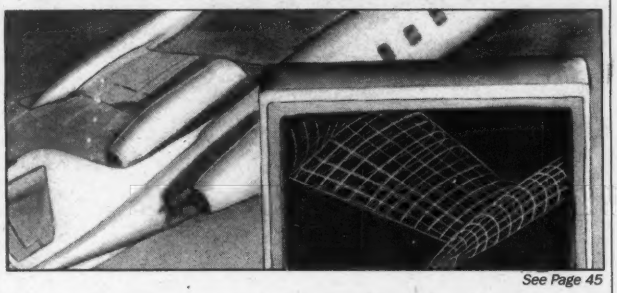
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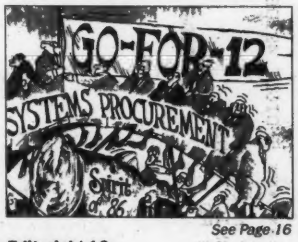
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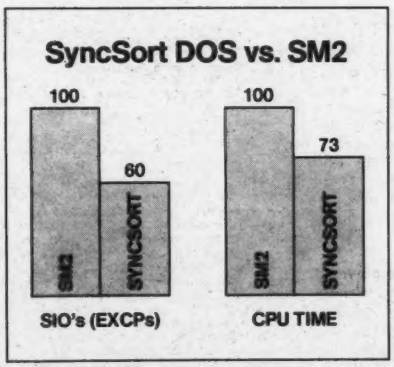
PAGE ONE ILLUSTRATION BY ALAN D. HOPKINS

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# Sperry action angers users

From page 1

are too many alternatives to their mainframes when there are PCs out there with 4M bytes of memory. I've estimated it would take us five years to get off Sperry systems. With this, I'd give serious thought to doing it."

"I think they're running scared," says Bill Regan, vice-president and general manager of Datec, Inc., a New Orleans firm using a 1100/60 in its development of computer-aided design software for construction of offshore oil rig platforms. "They've told the entire world that one of their major competitors is third-party resellers. They have essentially said that people locked into them have to keep coming back, but they've written off new business."

Sperry confirmed recently that it will charge an operating system license on mainframe purchases from any sources other than Sperry itself, including both third-party sellers and DP shops [CW, Feb. 17]. The software charges range from $15,000 for a System 80 Model 3, 4, 5 or 6 to $175,000 for an 1100/90 series CPU.

### Discouraging third-party purchases

The move appears designed to discourage purchases of new and used machines in the third-party aftermarket, which, sources say, Sperry has been battling for years. But Sperry users say the policy directly threatens the residual value of their machines, since any future buyer of their used equipment will be faced with the software licensing charge.

"If I want to move to an 1100/91, what am I supposed to do with my 1100/72? Push it into the East River?" Owens asks. "If I pay for bundled systems software, that technology belongs to me. Sperry is denying users the right to do business. They're trying to shut used equipment out of the market."

The unbundling policy comes at a time of highly aggressive Sperry pricing in competition with third parties as well as the company's emphasis on direct sales of its machines, rather than on leases. But analysts criticize the move as short-sighted if it eliminates the secondary market and alienates the Sperry user base.

"Sperry, like Amdahl Corp., has proven there are still some equipment manufacturers who haven't learned by IBM's mistakes," says International Data Corp. Vice-President Charles Greco, who follows the mainframe leasing and reselling market. "IBM tried to beat the secondary marketers for 20 years and couldn't, so it joined them with IBM Credit Corp. The Sperrys and Amdahls of the world think they can stymie the used market and stimulate new sales, but just the opposite is true. If a user can't dispose of his used machine, he's not going to buy a new one."

Some users say Sperry's schedule of operating system charges [CW, Feb. 24] raises the possibility that software could actually cost as much as hardware for a used machine at the low end of the mainframe line.

For example, Computer Resale, Inc. of Fairfield, Conn., sold a used System 80 Model 6 in December for $20,000, according to President Bob Weissblatt. Sperry's $15,000 software license charge would have increased the system price by 75%.

"I think the day when the software could cost more is probably coming," says Don Leachman, assistant director of MIS at the California Department of Motor Vehicles in Sacramento. "Although probably not at the high end, it could be possible, and it's not that far away. What bothered us personally is that we found out about it locally; all of a sudden there was this new policy."

### Discounting to undersell

Sperry will not comment on its motivation for the policy, but third-party sellers say the new charges are just the latest in an aggressive Sperry pattern of discounting to undersell them. And users who have leveraged the third-party option have often ended up with an attractive deal from Sperry.

"Historically, every time a third party got close, Sperry would come in, undercut the price, offer free applications software and so on," Weissblatt says. "They will do anything it takes to make sure they hold their portion of the market."

"Everyone pays a different price for the same thing in the Sperry world," says Robert Newstead, vice-president of Phoenix-based Oak Creek Funding Corp. "They publish a price book, but it doesn't mean a thing."

In addition to discouraging purchases through alternative channels, users say Sperry has also been pushing for direct sales of its hardware. "The main theme for Sperry is that they're trying desperately to swing users to direct purchase," says Martin Doyle, DP manager for Saab-Scania of America, Inc. in Orange, Conn. Saab-Scania leases its 1100/71 through Sperry Credit Corp.

## Sperry software charges

| Sperry System | Typical Third-Party System Price (new) | Sperry Charge for System Software |
|---|---|---|
| 1100/90 | $5 million | $175,000 |
| 1100/80 | $1.04 million | $125,000 |
| 1100/70 | $680,000 | $ 75,000 |
| 1100/60 | $700,000 | $ 75,000 |
| 80/3, 80/4 | $ 76,000 | $ 15,000 |
| 80/5, 80/6 | $212,000 | $ 15,000 |
| 80/8 | $340,000 | $ 22,000 |

Source: Computer Intelligence Corp.

## TOP OF THE NEWS

**NEWS** from page 1

by Ameritech, reduced the cost of its three- and five-year leases and introduced a monthly lease plan. The monthly cost of the Datacom/DB DBMS with a minimum six-month rental, for example, is $4,485 for IBM's OS operating systems and $3,475 for DOS. A three-year lease for the OS version of Datacom/DB fell from $4,777 to $3,975 per month. A five-year lease for the same product was reduced from $4,155 to $3,735 per month. The permanent license fee remains $116,000 for OS and $89,800 for DOS. An ADR spokesman says the new pricing scheme "reflects the company's plan to build for future profits."

■

**The U.S. Department of Commerce** today is expected to make a preliminary ruling on U.S. chip maker charges that Japanese semiconductor firms illegally dumped erasable programmable read-only memory chips in the U.S. market.

■

**Information Science, Inc. next week is scheduled to unveil** the first micro version of its human resources management software. Information Science's Personality for the IBM Personal Computer will incorporate two modules from the vendor's human resource management systems for IBM mainframes and Wang Laboratories VS minicomputers.

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# Harris to unveil OA file server embracing IBM technology

## Concept 4300 supports up to eight workstations

**By James A. Martin**

ATLANTA — Harris Corp.'s Integrated Systems Marketing Group will unveil this week its Concept 4300, a dedicated file server that is said to be the first Harris office automation product that embraces IBM's Personal Computer technology.

The Concept 4300 is a multiuser, multitasking OA system that runs on Microsoft Corp.'s Xenix operating system and supports up to eight Harris workstations or IBM Personal Computers under PC-DOS 3.1. The 4300 connects workstations and PCs through Harris' proprietary network interface, Perspective, which supports IBM's Netbios, the IBM PC Network and, eventually, the token-ring architecture.

In addition, the 4300 reportedly offers users a transparent interface to run applications in Microsoft MS-DOS and Xenix and H-DOS, the Harris operating system, and provides 3270 terminal emulation for workstations without the need for an emulation board on the workstations, the company said. Emulation hardware and software reside on the 4300.

"An office automation solution today can't ignore the IBM PC," said Steve Testerman, product group manager for the Integrated Systems Marketing Group. "We hadn't embraced the PC users and brought them into a network before."

One observer with close ties to Harris said the firm's embrace of IBM's Personal Computer technology in the office environment is "an idea whose time has long since come." Roger Manley, associate dean of the management department at Florida Institute of Technology in Melbourne, Fla., said, "I know that Harris feels it has missed the boat in its initial [OA] entries because of noncompatability and the subsequent problems that it caused."

The 4300 is the latest addition to the Harris Concept III, which consists of a network of departmental file and work group servers and workstations. The 4300 can serve as a node to a Concept 6000 system, a file server, applications processor and network gateway system that supports up to 28 nodes. Testerman said that users can configure 4300s with a network of seven 6000s to support up to 1,500 workstations.

A basic configuration of the 4300, available now, supports up to eight workstations, has one 28M-byte disk drive expandable to 354M bytes, 512K-byte random-access memory and the Perspective interface that acts as a network manager. It sells for $8,190. A 3270 emulation board for the 4300 costs $695.

# Aspen unwraps IBM 3480-type tape cartridge

**By Donna Raimondi**

The storage industry's long wait for an IBM 3480 tape cartridge clone may be over. An 18-month-old peripherals company is poised to deliver a totally compatible 3480-type device in early June.

Aspen Peripherals Corp., a Longmont, Colo., firm started by former Storage Technology Corp. (STC) Engineering Vice-President Ron Vitullo, may beat out rival firms by a year to 18 months, according to John Wicken, Aspen's controller. Contracts have already been signed with OEM companies, including Miltope of Melville, N.Y., a military contractor, and Aweida Systems, the company formed last year by STC founder Jesse Aweida.

Aspen will be able to release the product quickly because the company is not offering full services and support for the system, said James Moore, vice-president and director of computer storage industry services at Dataquest, Inc. in San Jose, Calif. The product will initially be sold only to the OEM market and will not include the controllers and software that plug-compatible manufacturers will have to incorporate when they announce their look-alikes.

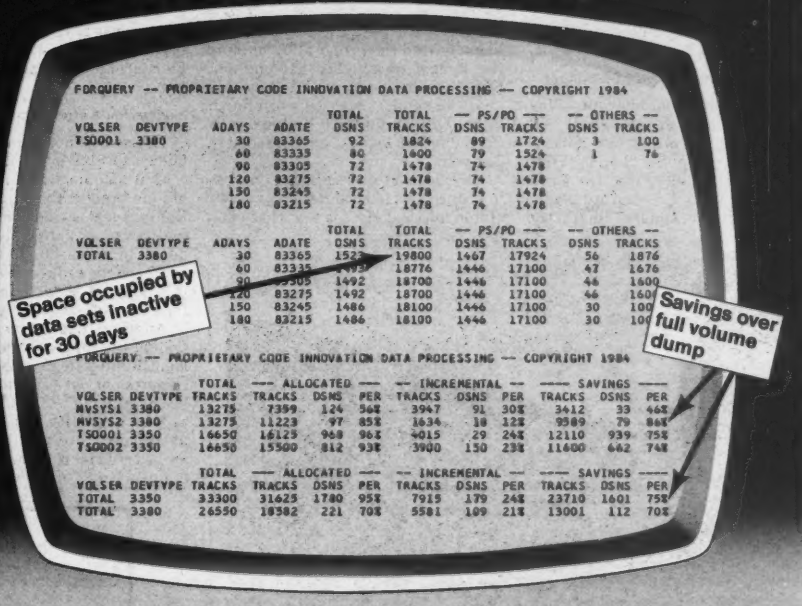
The as-yet-unnamed product is significant because it will enable other systems integrators to procure a drive that allows compatibility with IBM media, Moore said.

The product is said to be about half the size of IBM's 3480 system because Aspen used a brushless motor and cut the mechanics in half, Wicken said.

Prices will reportedly be lower than IBM's. A dual-drive unit will cost approximately $26,000 compared with $43,000 for a similar IBM unit, he added. OEM quantities will bring the price of a single Aspen drive unit to $8,000.

The tape unit is said to have a 3M byte/sec. transfer rate, an 18-track head and a thin-film recording head. The read/write speed is 78.74 in./sec. and 157.48 in./sec. at high speed. Rewind speed is 157.48 in./sec. The tape's capacity is 246M bytes unformatted and 218M bytes formatted.


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# Budget cuts spur COS policy stand

From page 1

ports continuation of the institute's programs with a budget of at least $10 million, according to Charlotte LeGates, spokeswoman for the Computer and Business Equipment Manufacturers Association (CBEMA).

COS, hoping to accelerate the development and use of computer networking standards, announced in January that it would work with the institute to accomplish its goals. COS needs the NBS unit because the agency has already conducted important OSI research and has considerable clout in the international standards community, sources noted.

COS board member David Martin is expected to testify on the NBS budget at a congressional hearing on Tuesday, along with a representative of the Computer and Communications Industry Association. Martin is president of the National Advanced Systems Division of National Semiconductor Corp. CBEMA President Vico E. Henriques will testify Thursday.

### Conflicting signals about NBS budget

The Reagan administration has sent conflicting signals about the NBS budget, according to government sources. On one hand, White House officials hinted that the emergence of COS in the private sector helps to justify the budget cut. On the other hand, a top NBS official said that network standards would not be cut from the institute's budget.

"The administration has sought a $5 million cut for several years, and it happens that this year the COS thing is an excuse that helps to justify that same $5 million," said one government source.

In previous budget battles, the computer industry has argued that the Institute for Computer Sciences and Technology helps to improve the management of the $14 billion government DP budget and performs important research and testing programs on computer network interfaces and protocols.

The budget document from the White House said that the smaller agency would have to concentrate on federal DP management, such as issuing guidelines on software management, end-user computing, computer security and information management. The document added that the NBS will be studying what effects the private COS organization will have on the institute.

This is the sixth consecutive year that the Reagan administration has sought a major cut in the institute's budget. In the past, the U.S. Congress has rebuffed the proposal by holding the budget at roughly $10 million. NBS insiders are worried that this year the support may be worn down by the Gramm-Rudman-Hollings deficit reduction legislation passed late last year.

That legislation requires Congress to reduce the federal deficit to $144 billion in fiscal 1987, a feat that calls for roughly $50 billion in budget cuts.

John P. McTague, the president's science adviser, said the Reagan research budget reflects the tough choices that are necessary in the Gramm-Rudman-Hollings environment. "We can fund only those programs that are necessary and not just good or worthy," he said at a budget briefing sponsored by the Institute of Electrical and Electronics Engineers, Inc.

### Legislation's effect on institute

In fiscal 1986, the institute had a budget of $9.7 million, but on March 1, that amount was cut 4.3% to $9.2 million under the Gramm-Rudman-Hollings legislation. The March 1 cut will cause an across-the-board slowdown in research and publications and perhaps reduce the frequency of the institute's participation in conferences, an NBS source said.

Another federal agency that is feeling the pinch of the Gramm-Rudman-Hollings legislation is the U.S. Department of Defense Advanced Projects Agency (DARPA). The areas in which DARPA is best known for its research are advanced computer architectures, robotics, artificial intelligence and other aspects of fifth-generation computing [CW, May 6].

The fiscal 1986 budget for DARPA's Strategic Computing Program was cut by 27%, from $142 million to $104 million, by the Gramm-Rudman-Hollings legislation. Because the law protected the president's Strategic Defense Initiative, a space-based defense shield, from any budget cuts, other Department of Defense research programs had to absorb double reductions.

"Unfortunately, DARPA took a double hit," said Col. Donald I. Carter, a Pentagon research official. "We think we can recover, and we hope to do that," he added. The proposed fiscal 1987 budget for the Strategic Computing Program is approximately $146 million, according to a Pentagon spokesman.

A DARPA official declined to identify what areas of research would be curtailed by the budget cut.

In addition to being insulated from a fiscal 1986 budget cut, the president's top priority — the Strategic Defense Initiative — would get a 74% increase to $4.8 billion in fiscal 1987, if Congress approves the president's budget request. Of that amount, $462 million is slated for the computer systems and software intended to manage a missile battle in space.

## Selected government research budgets
(in millions of dollars)

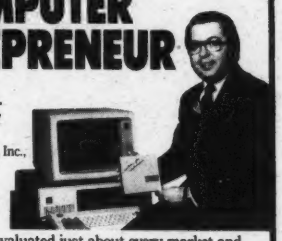
| | Fiscal Year 1985 | Fiscal Year 1986 (original) | Fiscal Year 1986 (Gramm-Rudman-Hollings) | Fiscal Year 1987 (proposed) | Percent of Change, 1985-87 |
|---|---|---|---|---|---|
| DARPA's Strategic Computing Program | 68.3 | 142 | 104 | 146 | Up 114% |
| NBS Institute for Computer Sciences & Technology | 10.1 | 9.7 | 9.2 | 5 | Down 50% |
| Strategic Defense Initiative: Systems and Battle Management | 100.3 | 227.3 | 227.3 | 462.2 | Up 361% |

CW Chart




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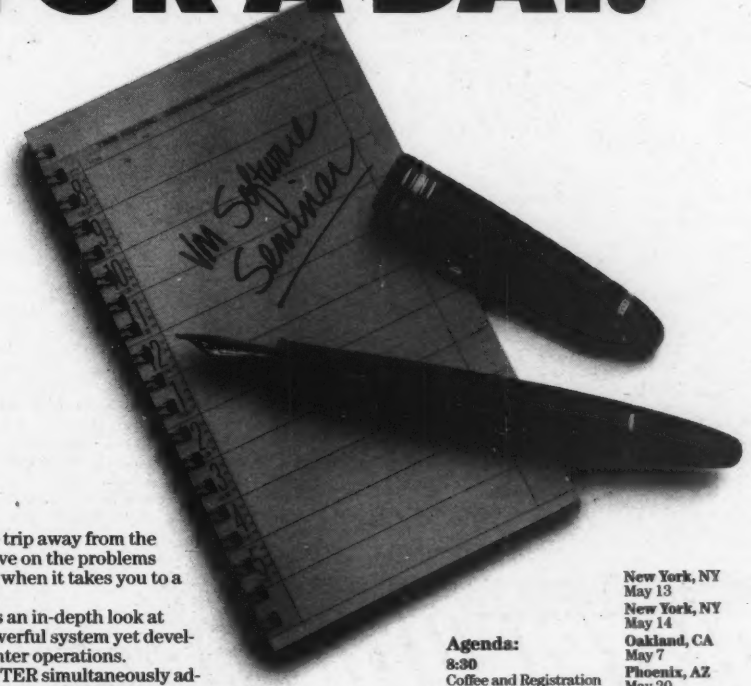
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NEWS

# High industry interest, few products mark compact disk show

By Maura McEnaney

SEATTLE — Storing the equivalent of 250 bound volumes of information on a 12-centimeter disk that costs $10 is now a reality. But it will be years before that technology is brought into corporate MIS departments, observers said last week.

Microsoft Corp.'s First International Conference on CD-ROM (compact disk read-only memory) brought together more than 900 software developers, data base publishers and information seekers in what appeared to be the official christening of CD-ROM technology. Although excitement over the prospects of CD-ROM was high, product announcements, hindered by some yet-unresolved CD-ROM standards issues, were few.

The High Sierra Group, including Apple Computer, Inc., Digital Equipment Corp. and Microsoft, among others, did announce proposed standards for a volume table of contents and for a directory structure.

"Most of what is being talked about today is not a shippable product," said Jan Lewis of the Palo Alto (Calif.) Research Group. "Everybody is waiting for everybody else."

CD-ROM is a computer-based storage system that uses a reader and a laser-type optical disk to provide 1,000 times more storage capacity than a floppy disk. It can store a combination of digital images, data, audio and computer code. Unlike floppy disks, however, CD-ROM has a read-only capacity.

Users getting their first glimpses of CD-ROM technology at the conference included Dick Halberstadt, design specialist for Procter & Gamble Co. in Cincinnati.

"I'm here as a potential end user, but I think we first have to see what is going to come out of this. So far I haven't figured that out," he said.

"If you have enough data and kept it enough years and accessed it in enough places, I suppose it would be cheaper to put it on a CD-ROM," Halberstadt said.

> ***'The most interesting aspect of CD-ROM is in the consumer market.'***
>
> — Bill Gates
> Microsoft Corp.

In a move designed to promote software titles, CD-ROM pioneer and keynote speaker Gary Kildall announced a joint venture between his company and Sony Corp., establishing a service bureau for potential CD-ROM publishers. Under the joint venture, Kildall's Knowledgeset Corp. will offer data preparation services and Sony's Digital Audio Disc Corp. in Terre Haute, Ind., will master and reproduce CD-ROM software.

Kildall (see related story facing page) said the joint venture is designed to attract software publishers that do not want to make large investments in CD-ROM reproduction equipment needed to produce a master disk. "Anyone who wants to get into the CD-ROM business can have it done for them," Kildall said.

Data base publishing is the first and will remain the largest application for CD-ROM technology during the next few years, according to Edward Rothchild, chairman of Rothchild Consultants in San Francisco, publishers of "Optical Memory News" and "Optical Memory Reports."

Jim Porter, publisher of "Disk/Trend News" in Mountain View, Calif., agreed. "I think the big use in the next year or two will be to distribute data bases that already exist."

### Most obvious use in networks

CD-ROM applications within large companies also hold some potential but not for some time. "It's such a cheap way of offering a whole lot of stuff to in-house users," said Porter, who did not attend the conference. The most obvious use would be to make CD-ROM data bases available in a network.

To date, more than 11,000 CD-ROM players have been shipped worldwide, the majority of which has been sold to systems integrators, he said. By 1990, there will be more than five million installed CD-ROM drives, more than 74 million CD-ROM disks will be sold, and revenue for CD-ROM drives will hit $500 million, he said.

Microsoft Chairman Bill Gates acknowledged that "the most interesting aspect of CD-ROM is in the consumer market." Although CD-ROM could be used in DP shops, read/write applications are more important.

Through the recent purchase of Cytation, Inc., Microsoft is looking to be a factor in the CD-ROM market. But just what that will involve remains to be seen. Speculation that Microsoft would use the conference to announce CD-ROM support in a new version of MS-DOS was put to a halt by Microsoft President Jon Shirley.

The company sponsored the conference to promote the technology, Shirley told *Computerworld*. "There has never been anything in the computer industry that has required so much cooperation from so many different groups," he said. "This is a chicken-and-egg situation. All the companies are agreeing to push to make the products happen. We felt it needed a push, and this is it."



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# CD-ROM to take blinders off users searching data bases

By Eric Bender

Supplanting many functions of on-line data services, compact disk read-only memory (CD-ROM) players also will help "take the blinders off" users searching through large data bases, according to microcomputer pioneer Gary Kildall.

The inventor of the CP/M operating system and cofounder of Digital Research, Inc., Kildall was the keynote speaker at last week's CD-ROM conference. A leading proponent of the technology, he is president of Knowledgeset Corp., formerly known as Activenture Corp., which recently introduced a combination of CD-ROM and electronic encyclopedia.

Kildall, still chairman of Digital Research, offered his views on CD-ROM in a recent interview.

**CW:** Why did your work shift from videodisks to CD-ROM?

**KILDALL:** CD-ROMs started to be a really nice alternative to the big disks because we had a digital recording standard that was emerging because of the Sony Corp. and Philips Co. connection. CD has the unfortunate problem that it doesn't do video very well. But fortunately the digital information is a lot more versatile. It can do compressed audio, compressed video and all sorts of interesting things.

**CW:** But for the moment, your on-disk encyclopedia offers only text.

**KILDALL:** Yes. We have a prototype disk that has pictures, but the production disk does not. The reason is not a technology issue; it's mostly an ownership issue. Publishers generally don't own all of their pictures, and to get the rights to them is very, very difficult. Then you've got to scan them and put them on the disk.

But the technology supports it. Text is only the starting point; it's really good for doing reports. If you're extracting text in your word processor, pictures aren't going to do you a whole lot of good.

**CW:** Where will CD-ROMs fit into a DP environment?

**KILDALL:** I don't see a CD hanging off a mainframe as being a particularly good match. That's an extreme, obviously, but the thing you see hanging off the mainframe will be a big optical disk. They seem to match as far as cost, reliability and things like that.

I see the CD as being more of a personal thing.

Let's take a vertical market — law — which is going to be hit by CDs real hard. We have thousands of lawyers who access things on-line right now and quite a few more who don't. It's a big market, with a lot of people with a lot of money, and they've been used to spending a lot of money on on-line systems. It's a good example of the way we'll see CDs being used in an office — where people don't have access to a mainframe or where they want to minimize their charges for on-line services.

The other thing that's kind of nice about an environment like that is the access to the data. Because it's local and because it's a very high rate when you get to the right place on a disk (you're transferring at 150K byte/sec.), your ability to explore the data and browse is much more powerful than with on-line systems at 1,200 bit/sec.

That really opens that data base up. All of a sudden you've got your blinders off. An on-line system is like looking through a little peephole at your data. People will say, "I want to have my data on CDs, rather than have it on-line." The natural effect is that data that's on-line now will be reduced to the most recent stuff.

**INTERVIEW**



Gary Kildall, president of Knowledgeset Corp.

Companies that have their own on-line internal services probably aren't going to be using CDs at all, because the volume isn't high enough on their data base normally. They might want to have a [large optical system] or keep it on magnetic disk.

**CW:** How will suppliers enter this market?

**KILDALL:** We'd like to say that you can start your own little garage shop operation and write yourself a clever word processing program and do a little desktop publishing thing, and all of a sudden you've got a big industry. Well, you can't do that with CDs. You can't put together an encyclopedia (or an information base of that sort) yourself. It's a team effort; it takes thousands of people.

To make this whole thing successful, the real key is to make it very easy for a publisher to bring his current materials into CD form and then take those materials and work with them to take advantage of the multimedia capabilities.

We don't want to go out there and do the Library of Congress, for example, or do all public-domain programs. People would look at that and say, "Oh, that's really nice" and then go on to something else. But if you really give people ways they can explore and have fun at the same time, that's the real key to it.

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NEWS

# STC upgrades high-speed printer line with impact model

By James Connolly

LOUISVILLE, Colo. — Storage Technology Corp. (STC) last week broadened its approach on the high-performance printer market with a 5,000 line/min impact printer designed for use in large data centers.

The 5000 Series Printer Subsystem, which uses dual hammer bank technology to produce two lines simultaneously, was introduced into a market where STC already has a 103 page/min nonimpact printer and where STC and other companies, including IBM, have printers with speeds exceeding 3,000 line/min.

"It was an interesting announcement in that STC was already doing well in that high-speed market with a nonimpact printer. It looks like they may be covering the people who have not been weaned over to nonimpact printers. It appears that they are putting a lot of their eggs into one basket with printers," said Steve Pytka, vice-president of C. A. Pesko Associates, a Marshfield, Mass., consulting firm specializing in printers.

Pytka theorized that STC, which has operated amid financial difficulties in recent years, may be shifting more of its attention to printers, an area upon which the peripherals manufacturer has not concentrated in the past.

Analyst James Minervino of International Data Corp. added, "STC in the past has managed to capture only a small percentage of the printer market. I do not think this announcement is revolutionary, but there is no doubt the product represents a significant gain in price and performance."

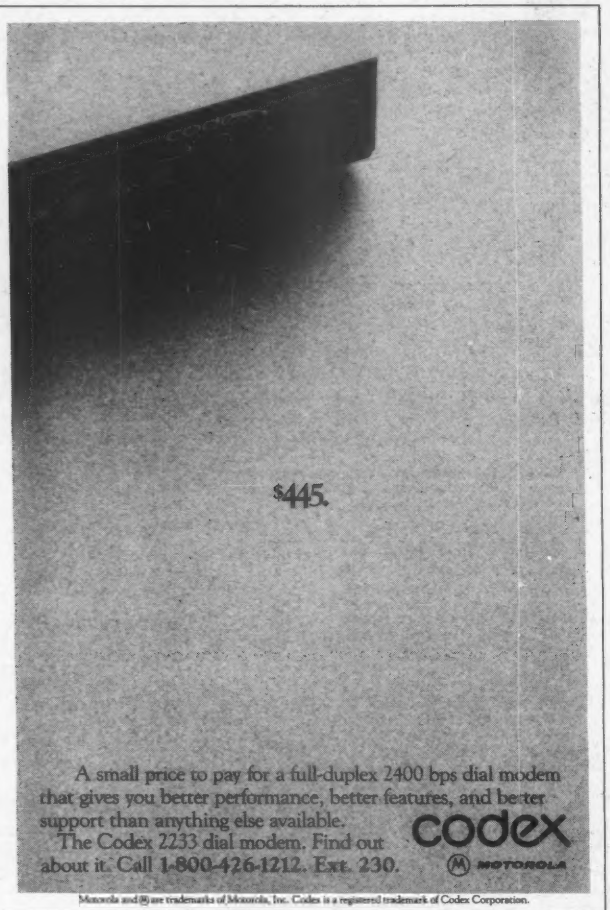
STC said that each of the hammer banks operates simultaneously under its own electronic control to provide gains in print speeds and hammer bank redundancy.

According to a spokesman, print quality has been improved by having 1,152 characters — 2.4 times more characters than on other printers — moving 250 times slower than bands on other printers.

The 5000 Series reportedly runs with IBM 370 architecture mainframes and compatibles. The printers are free-standing units containing power supply, cooling and vacuum systems, print mechanism, control logic and powered stackers.

There are two models in the series, the Model 5280 with a print speed of 2,800 line/min and the Model 5500 with selectable print speeds of 3,000, 3,800 and 5,000 line/min. The 5280 is upgradable to a 5500, according to the vendor.

The 5280 costs $50,000, and the 5500 costs $89,000. Maintenance pricing during the one-year warranty period is $550 per month for the 5280 and $1,070 per month for the 5500. Both printers are due to be available in mid-1986.



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# IBM rolls out tape drive replacement for its 16-year-old, reel-to-reel 3420

RYE BROOK, N.Y. — IBM, which two years ago shifted its attention to cartridge technology for its large-scale tape drives, last week introduced a replacement for its 16-year-old 3420 reel-to-reel drive.

The IBM 3422 tape subsystem is targeted to DP shops running IBM 4300 and System/38 mid-size processors and to IBM 3080 and IBM 3090 mainframe installations that still use 10-in. reel-to-reel, ½-in. tape drives.

According to IBM officials, the 3422 is more compact because of denser packaging and is less expensive than the 3420 drive.

A key feature of the new drive is an integrated controller, which eliminates the need for an IBM 3803 tape controller. The drive is available in two models, the A01 and the B01. The A01 includes the controller and can support up to seven B01 units.

**Is price low enough for user?**

Analyst Thomas Henkel of the Yankee Group in Boston said the 3422 announcement appeared to be an IBM effort to take advantage of technological developments and to pass those along to the user at a lower cost. He said the key issue for the user will be whether the price is low enough to make buying the 3422 worthwhile at a time when used 3420s are selling at 40% of the original list price.

The 3422 operates at 125 in./sec. and can read and record data at either 6,250 byte/in. or 1,600 byte/in. It runs at 780K byte/sec. at 6,250 byte/in. or at 200K byte/sec. at 1,600 byte/in.

Options include a data streaming feature allowing 2M or 3M byte/sec. channel transfer rates, a two-channel switch allowing the 3422 to be addressed by two I/O channels and a communicator that connects two A01 units thus allowing either controller to address 16 tape units.

The A01 costs $36,800, and the B01 costs $17,900.

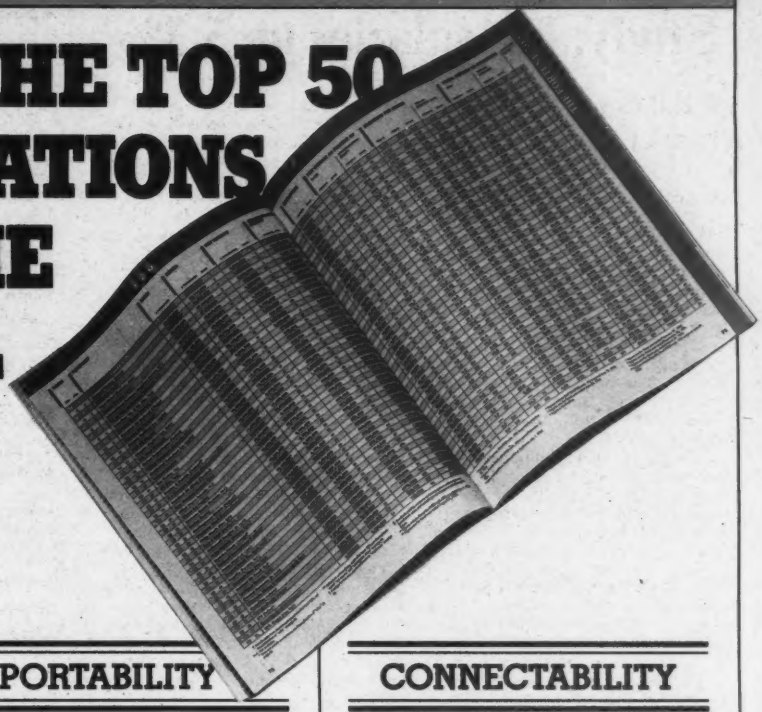
Customer shipments are scheduled for the second quarter of 1986.

— James Connolly

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# Study: DP salaries up 5.3%

## Utilities workers report highest average growth

By Eddy Goldberg

WILLOW GROVE, Pa. — Salaries for DP industry employees increased by an average 5.3% from 1984 to 1985, according to the fourth annual "Data Processing Salaries Report" released recently by the Administrative Management Society (AMS).

The study drew its conclusions from a sample of 47,333 DP employees in 2,085 companies in 99 cities in the U.S. and Canada, with annual base compensation reported as of Sept. 16, 1985.

The nearly 50,000 employees were broken down into five industrial sectors and 20 job positions, ranging from data entry and computer operators to managers of computer operations and applications programming.

On a regional basis, the Western U.S. showed the greatest rise at 9.3%, followed by the Southern U.S. at 6.7%, Canada at 6.5%, the East-Central U.S. at 5%, West-Central U.S. at 4.9% and the Eastern U.S. at 4.2%.

Of the five industrial sectors, employees in utilities experienced the highest average growth at 8.3%. The "others" category showed a 5.9% increase over 1984, while salaries increased by 4% to 4.1% for employees in manufacturing/processing, banking/insurance/financial and retail/wholesale sales and distribution.

Looking at salary growth by job, the leaders were data quality control clerk, at 9.4%; supervisor, data entry, at 9.4%; software systems programmer, at 8.2%; manager, computer operations, at 7.3%; and supervisor, computer operations, at 7.3%. Actual dollar amounts are shown in the accompanying table.

Differences existed within single job positions from one industry to another, with utilities nearly always coming out on top. The greatest variation in U.S. salaries was for managers of computer operations in the utilities sector, who earned an average $45,100, while salaries for the same position in the other four sectors ranged from $37,000 to $38,600.

Salary differences between industries were smaller in other job categories. For example, in the U.S., salaries for systems analysts (or senior programmers/analysts), which grew 5.5% overall, ranged from $31,400 in the banking/insurance/financial sector to $35,400 in utilities. And salaries for senior software systems programmers ranged from $34,800 in the others category to $38,000 in manufacturing/processing and $38,500 in utilities.

The survey was based on definitions of each of the 20 positions. The AMS said comparisons by position titles could be misleading and that comparisons should be based on the content of the job descriptions.

**Overall salaries by position, 1984-1985**
**U.S. summary**

| | 1984 | 1985 | Percent of Change |
|---|---|---|---|
| **Computer Operations** | | | |
| Manager, computer operations | $35,400 | $38,000 | +7.3 |
| Supervisor, computer operations | 25,900 | 27,800 | +7.3 |
| Lead computer operator | 20,900 | 21,000 | +0.5 |
| Computer operator, Level A | 17,600 | 18,400 | +4.5 |
| Computer operator, Level B | 15,600 | 16,100 | +3.2 |
| **Computer Operations Support Staff** | | | |
| Tape librarian | 15,500 | 16,400 | +5.8 |
| Data quality control clerk | 14,900 | 16,300 | +9.4 |
| **Data Entry Operations** | | | |
| Supervisor, data entry | 20,200 | 22,100 | +9.4 |
| Lead data entry operator | 16,000 | 16,800 | +5.0 |
| Data entry operator, Level A | 13,600 | 14,400 | +5.9 |
| Data entry operator, Level B | 12,800 | 13,100 | +2.3 |
| **Applications Programming** | | | |
| Manager, applications programming | 40,000 | 41,700 | +4.3 |
| Project leader (Lead programmer/analyst) | 35,600 | 37,400 | +5.1 |
| Systems analyst (Senior programmer/analyst) | 30,900 | 32,600 | +5.5 |
| Programmer/analyst | 26,300 | 27,400 | +4.2 |
| Programmer | 21,600 | 22,800 | +5.6 |
| **Software Systems Programming** | | | |
| Manager, software systems programming | 40,400 | 42,800 | +5.9 |
| Senior software systems programmer | 34,700 | 36,200 | +4.3 |
| Software systems programmer | 28,200 | 30,500 | +8.2 |
| **Data Base Management** | | | |
| Data base administrator | 36,400 | 37,400 | +2.7 |

Source: Administrative Management Society


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# LISP systems tied to SNA

From page 1

ments," said Harvey Newquist III, editor of "AI Trends," a newsletter published by Scottsdale, Ariz., consulting company DM Data.

Newquist said that SNA Facility makes possible a symbiotic relationship between knowledge-based applications running on the Symbolics machine and traditional data-based applications such as accounting and inventory, running on the IBM mainframe.

"Take an accounting program: The controller does 'what-if' analyses and proposals on the mainframe. An executive can then take that data, which is already available in the corporate data base, and load it directly into a financial modeling or simulation program running on the Symbolics computer," Newquist said.

**Direct access to mainframe data bases**

SNA Facility enables Symbolics applications to access mainframe data bases directly, the company said. Results of the Symbolics operations can then be transmitted back to the mainframe data base.

Randy Weisman, a manager responsible for artificial intelligence applications with Arthur Andersen & Co., said SNA Facility is potentially "the next best thing to having artificial intelligence on the mainframe.

"It would allow us to integrate the symbolic processing capabilities of the Symbolics machines with easy access to the mainframe data," Weisman said. The Chicago-based Big Eight accounting firm uses Symbolics computers to develop applications for client companies, many of which have IBM mainframe installations.

**Integration of programming**

Newquist said that the link could also be used to transfer applications developed on a Symbolics machine to an IBM mainframe. This process would permit integration of LISP-based and traditional programming, he said.

"For example, you could have a just-in-time expert system running on top of an inventory control program." Once LISP applications had been ported to an IBM host, they would be accessible to multiple users, Newquist added. "Otherwise, Symbolics applications are available on a one-person, one-machine basis."

> ***'It is not the step, but it is certainly one step toward integrating the LISP and MIS environments.'***
>
> — Harvey Newquist III
> 'AI Trends'

Symbolics spokeswoman Brenda Kelly said SNA Facility supports Symbolics' 3600 series of LISP machines and IBM 4300, 3030, 3080 and 370 series mainframes running under either DOS/VSE or MVS, using SNA and a standard RS-232 connection.

**High-level applications interface**

Symbolics provides a high-level applications interface that uses CICS to access VSAM files, greatly reducing the amount of programming needed to set up data links within a LISP application, and supports the VTAM network access method, according to Kelly.

She added that data must first be reformatted from IBM's version of VSAM to Symbolic's version. She also said that if the files are not in VSAM format, data conversion can "get pretty hairy."

SNA Facility is available in three configurations. Model S-SNA-1, which includes a hardware protocol converter and software for both Symbolics and IBM hosts, costs $17,900. Model S-SNA-2, hardware and software for an additional Symbolics host at existing installations, costs $4,900. Model S-SNA-3, software for an additional IBM host at existing installations, also costs $4,900.

# Lotus extends 1-2-3 Release 2 upgrade deadline

CAMBRIDGE, Mass. — Lotus Development Corp. will extend its upgrade program for 1-2-3 Release 2 through the end of the year, to accommodate its estimated one million-plus users of the spreadsheet program.

Lotus said it decided to continue the upgrade program, which was scheduled to end on March 31, to accommodate those corporate customers who requested more time for the transition between the two 1-2-3 versions, according to Michael Kolowich, corporate vice-president of marketing.

Lotus charges $150 per individual copy for an upgrade from Release 1A to Release B, which came out last September.

The company also offers volume discounts on upgrades handled by a corporate purchasing group, charging $125 per copy for 100 to 1,000 copies and $100 per copy for more than 1,000 copies.


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# Grid Systems adds enhanced screen to lap-size computer

## Features nonglare, non-light-emitting LCD

**By Douglas Barney**

MOUNTAIN VIEW, Calif. — In an effort to improve the quality of its LCD display, Grid Systems Corp. today is scheduled to announce a new screen for its $3,150 Gridcase2 lap-size computer.

The new screen, now shipping with the Gridcase2 at no additional price, is an enhanced, nonglare, non-light-emitting LCD screen manufactured for Grid by a Japanese firm that Grid officials declined to name. The new LCD technology used by Grid may show up on lap-size machines from other vendors.

"I would not be surprised to see others come along with the same screen," said Peter Teige, industry analyst, personal computer industry service, for Dataquest, Inc., a San Jose, Calif.-based research firm. One advantage of multiple vendors using the screen will be lower prices, Teige said.

The main advantage of the new screen is greater contrast. The 7:1 contrast ratio of the new screen is nearly double the 4:1 ratio of the previous display, according to Teige.

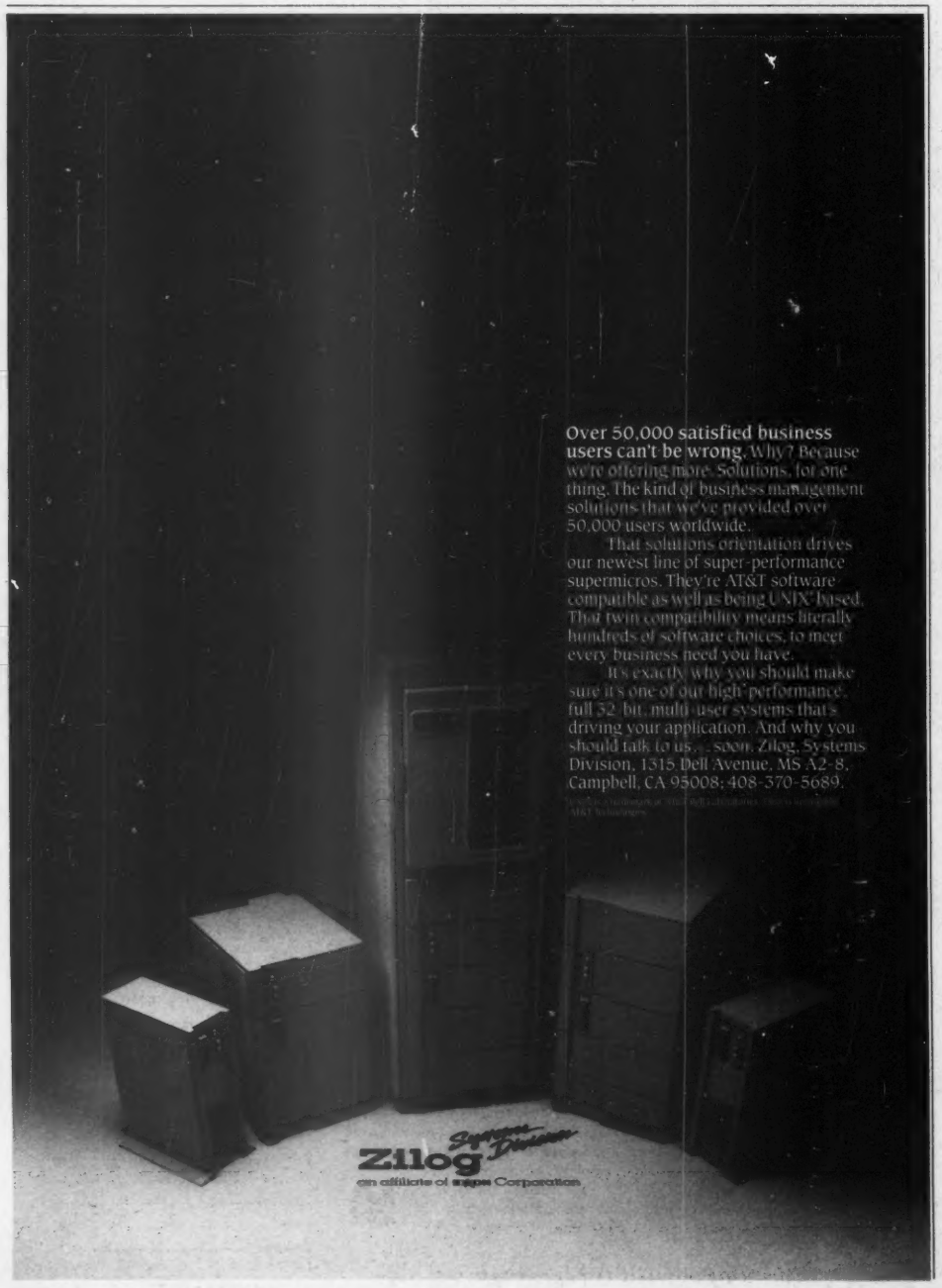
"That screen really delivered on the unfullfilled promise of the LCD to provide a compact, energy-efficient display that is readable," Teige said. "It will make those seeking a better display take another look at the Grid machine."

Unlike the display on Zenith Data Systems Corp.'s Z-171, Grid's new LCD screen is not backlit. The firm chose not to use backlit technology in large part because of problems with long-term reliability. "They tend to degrade after six months," said Alan B. Lefkof, vice-president of marketing for Grid. In addition, backlit displays wash out in well-lit rooms, Lefkof said.

Grid officials expect the Gridcase2 to be most popular for engineering and audit applications. The Gridcase3, which has a light-emitting, plasma display, is currently the firm's best-seller. Because the plasma display remains crisp when viewed from various angles, the Gridcase3 will continue to dominate the sales presentation market, Lefkof said.

Current Gridcase2 owners will be able to upgrade to the new screen by the third quarter. No prices for the upgrade have been determined.

The Gridcase is available with up to 512K bytes random-access memory, a 720K-byte, 3½-in. floppy disk drive and 512K bytes of read-only memory. It weighs less than 12 pounds. Peripherals include a battery charger, 5¼-in. floppy disk drive and a 10M-byte external hard disk drive.




# Hard-disk laptop debuts

**By Peggy Watt**

SAN LEANDRO, Calif. — Morrow Designs, Inc. last week introduced a hard-disk version of the laptop computer that recently won a $27 million government contract in an OEM version.

The battery-operated, 14½-lb Pivot XT, with 320K bytes of random-access memory (RAM), an internal 10M-byte hard disk and backlit LCD screen, will be available in June, Morrow spokesmen said. Like its predecessor, the Pivot II, it is based on the Intel Corp. 80C88 CMOS 16-bit microprocessor and is compatible with the IBM Personal Computer. It measures 13 in. by 6 in. by 9½ in.

Both models offer an optional 300/1,200 bit/sec. internal modem and a battery that runs for more than two hours without recharging. The Pivot XT system sells for $3,115.

Retail price of the fully configured Pivot II, with 640K bytes of RAM, two 5¼-in. floppy disk drives and modem, was dropped $920 to $2,875 with the introduction of the Pivot XT. Hard-disk upgrades for the Pivot II are available for $1,200, and new screens are available for $250.

Morrow retained few design rights in its OEM agreement with Zenith Data Systems Corp. and will benefit little monetarily from Zenith's recently announced contract with the Internal Revenue Service for more than 15,000 of its Z-171 laptops [CW, March 3]. But Morrow founder and Chairman George Morrow said he expects that IRS' blessing will be a boon for laptop computing.

"It's not a legitimate market yet. People don't feel they should have to pay as much for this type of machine as they do for a desktop," Morrow said. But adding a hard disk and more readable screen, with higher contrast blue-and-gray tint, brings the laptop to the full-function capabilities of a desktop, even while it remains portable.

While Morrow itself was not among the bidders for the IRS contract, its design was the basis of bids by both Zenith and Sperry Corp., which also entered with an OEM version of the Pivot. Morrow said the IRS' choice solidifies the 5¼-in. drive as a standard, even for laptops.

NEWS

# *Manny Hanny's DASD challenge*

From page 1

At least part of what the bank learned was that there are better ways to deal with DASD managers and the planning tools that they use.

"We had hoped that we could establish a capacity planning methodology for DASD. That might be a dream for now. What I would like to do is at least keep the data resource managers talking to each other. If nothing else, that might limit the proliferation of different products out there," according to Raffael J. Guidone, senior technical officer.

Guidone and Huebsch are now coordinating interviews with data resource managers and other managers in four major New York data centers. They are holding periodic informal meetings with all of the bank's data resource managers to discuss new DASD management products and techniques. It is an effort to keep all of the managers aware of the DASD control problem and some of the solutions.

Recalling how the DASD management project got started, Huebsch says, "We sat down to review where we were going and recognized that you cannot know where you are going if you do not know where you are coming from. What we discovered was that the greatest portion of our hardware expense was DASD. We wanted to know how well it was being used and why it was being used."

> ***'The idea was to look not just at the numbers but to look at the management practices that led to those numbers.'***
>
> — Raffael J. Guidone
> Manufacturers Hanover Trust Co.

The data center chosen for the pilot study had recently hired a DASD manager who had a staff of four people and who had already begun tightening disk management.

The center at that time was using 63.8% of allocated disk space. Under the pilot program, disk use was improved to 70.3%, and the actual number of bytes in use was cut by 0.014%. But the amount of allocated space was cut by 3.8G bytes — the equivalent of six IBM 3380 disk drive volumes, or 6% of the data center's DASD capacity.

The data center was running an IBM 3033 and an IBM 3083 mainframe and had 64.4G bytes of DASD storage but has upgraded its mainframes. It is raising its DASD capacity to more than 100G bytes, in part by replacing an IBM 3850 mass storage device with disk drives this year.

"With this pilot data center, the idea was to look not just at the numbers but to look at the management practices that led to those numbers," says Guidone, noting that most of the bank's data centers already had some DASD management tools.

The bank officials found that simply educating programmers and imposing tighter control of data set allocation can improve efficiency and that more efficiency can be achieved by ensuring that the proper type of disk drive is being used for a particular size of data sets.

According to the researchers, different business groups in the bank had different requirements, so they could not order standardization of data set sizes or any other bankwide specifications.

Typical of the variances, Guidone notes that use of VSAM, for which the pilot study found DASD efficiency was difficult to measure, ranged from 21% of applications in one data center to as much as 50% in other data centers. The study also found that use of DASD varied widely among users in three primary areas: systems programming, production and testing and development. In the pilot center, systems groups tended to have the most underused DASD allocation.

Recognizing that bankwide regulations on DASD use were probably unrealistic, Guidone and Heubsch say they are concentrating on gathering more information about how all of the major data centers are managing DASD and are offering a forum for exchange of ideas and establishment of guidelines.

Some of the recommendations deal with how the groups should hire, train and treat the individuals charged with DASD management responsibilities.

"We suggest that the managers strengthen that data resource management group both in staff and in training of that staff. They have to recognize that theirs is an important job, and they should be giving these people a career path to follow," Guidone says. He also recommends stronger ties between DASD management personnel and applications programmers.

Heubsch notes that although DASD management once was viewed as a junior operations center job, there are now enough experienced personnel available for companies to hire professionals who want to make a career in capacity planning.

He and Guidone add that even with the per-gigabyte cost of DASD dropping over the years, the cost of people to support DASD is growing, thus justifying the professionalization of data resource management.

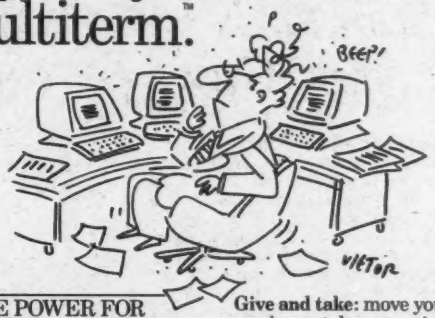
Guidone says the cost of the pilot data center was $2,340 per month per gigabyte, including personnel costs, and that a comparable figure for the entire bank is $2,000 per month. New disk technologies can cut those costs to $1,000 per month, but $300 of that is for personnel, he says. At present, the bank uses an average of one person for each 10G to 20G bytes of DASD, depending on the data center.

"We think that the personnel cost, that 30% of incremental costs, is the place to look for the greatest savings. It is possible to cut 20% of our hardware growth and 50% of our personnel growth by increasing what each person is able to do," Guidone says.

Finally, Guidone says, data center managers should look for automated DASD management tools that take some key day-to-day decisions out of the hands of people, so that when a file is purged because it has been unused for a year, the manager can point a finger at the system and the rules under which it operates.

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# VIEWPOINT

## EDITORIAL

## *Standards vs. Star Wars*

It is with some trepidation that we venture into the troubled waters of federal budget debates to call attention to a particularly ill-advised proposal by the Reagan administration, namely, to cut in half — from $10 million in 1985 to $5 million in 1987 — the already-bare-bones budget of the National Bureau of Standards. The NBS' Institute for Computer Sciences and Technology is helping to develop standards for computer communications and, in the process, has conducted some of the most important research to date on the Open Systems Interconnect communications model.

Particularly troubling is the administration's seemingly deliberate attempt to confuse the debate by first hinting that the emergence of the Corporation for Open Systems — a fledgling vendor-led standards group — helps to justify the cut, then later saying that the ICST network standards effort would not be curtailed regardless of what cuts occurred. A red herring if we ever saw one.

Also difficult to understand is the logic of halving the NBS budget — the budget of an agency applauded not only for its communications standards work but also for its guidelines that assist government DP managers in running a $14 billion shop — while more than tripling the dollars allocated, to $462 million, to research on Star Wars battle management software.

To cite all the reasons why international standards promoting computer communications are a better buy than software that conducts missile warfare would be to belabor the obvious. We can only hope the obvious becomes apparent to budget cutters as well.

## *Notes & observations*

We will have more — probably much more — to say about compact disk read-only memory technology in the coming months, but brief comment should be made on last week's first international conference on CD-ROM hosted by Microsoft Corp. in Seattle. The conference featured a great deal of excitement over a technology that is developing in several directions at once — as well as some controversy as to how important business applications are as one of those directions. Microsoft Chairman Bill Gates, for example, now views CD-ROM as creating a prodigious new market in the consumer sector and as being but one among many storage peripherals available for business computer users.

While the lure of the consumer market is understandable, CD-ROM nevertheless holds great potential as a vital new interactive knowledge distribution medium that — especially when linked with emerging natural language and expert systems technologies — can be a critical tool in shaping corporate information processing. Microsoft deserves great credit for spurring on this promising technology. MIS managers must now help make sure that it does not become next year's deflated balloon (vide videotext) by helping to develop viable CD-ROM applications within the corporation.




## LETTERS TO THE EDITOR

### RISC jury has yet to deliver verdict

Is *Computerworld* a wholly owned subsidiary of IBM or what?

On the one hand, in one editorial cartoon [CW, Jan. 20], Hewlett-Packard Co. is shown as a nervous aviator about to jump from a cliff supported only by a hang glider, which obviously won't fly, labeled with the acronym for reduced instruction set computing (RISC), while a mad scientist utters, "Trust me. It worked fine in the wind tunnel."

On the other hand, in another editorial cartoon [CW, Feb. 3], IBM's recent release of the RT Personal Computer, also based on RISC architecture, is seen as a wary tiger that is about to pounce on a water buffalo carrying nonchalant Apollo Computer, Inc., Digital Equipment Corp. and Sun Microsystems, Inc.

I would like to know just how in the world you can speculate on HP's demise for embracing RISC architecture in almost the same breath that you portray the IBM RT PC as a machine that will consume the scientific and engineering workstation market. The jury is still out on both of these situations; in fact, it has yet to meet.

**John Klever**
Director of data processing
Aurora Public Schools
Aurora, Calif.

### Beware false DBMS endorsements

I am getting numerous phone calls these days from people interested in obtaining data base management systems. They tell me that the vendor or salesman for system X quotes me as saying, "X is the DBMS that is most relational," or "X is the *only* relational system," or "X is better than Y," or "X is the best system."

In one case in Rochester, N.Y., a salesman claimed that I endorsed his product when, in fact, that product failed to meet the simple requirements for being minimally relational. For the time being, anyone who receives a claim of this type from a vendor or salesman should check with my office as to the validity of that claim. My general policy is to avoid endorsing any specific DBMS, and I have adhered to this policy stringently so far.

However, I do publicly criticize those DBMS vendors that make false claims about their products in their advertisements or lectures or manuals because such deception, whether intentional or not, tends to cause customers to make choices that are wrong — choices that will fail to meet customers' needs.

**E. F. Codd**
President
The Relational Institute
San Jose, Calif.

### A Pick system by any other name

A letter to the editor "Pick of the operating system litter" [CW, Feb. 17] asked why *Computerworld* hasn't provided more coverage of the Pick Systems Pick operating system. I believe most of the reason is that Pick has been renamed by its dozen or so OEMs, who have, for some reason, tended not to stress the portability of their customers' applications onto other Pick-based systems.

A case in point: Immediately below that letter was another letter extolling Revelation as "A grown-up multiuser micro DBMS" [CW, Feb. 17]. Revelation is just the name that Cosmos, the implementor, uses for Pick.

In that same issue of CW, there were at least two other Pick-related items: enhancements to McDonnell Douglas Computer Systems Co.'s Reality in the article "McDonnell Douglas makes additions to relational data base systems line" and Ultimate Corp.'s 140% increase in profits in "Nickels and Dimes."

Perhaps the profitability of Pick to its OEMs has resulted in their mum attitude. I noticed that the story "Prime Computer attributes record year to international sales" [CW, Feb. 17] made no mention of its Pick-type DBMS, Information.

What would it take to get vendors to stress rather than conceal their systems' compatibility with other licensees?

**Roger Knights**
Seattle

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3317-8610

# VIEWPOINT

## The case against computer literacy

By EFREM G. MALLACH

The seminar in the glossy brochure is called, "Computers for the Non-Computer Manager." It's "for managers . . . who work with or must communicate with computer personnel . . ." It begins with the background of data processing and the evolution of computers. It continues through the central processor, random and sequential files; covers several programming languages; talks about real-time, time sharing and batch; describes the system development process; mentions support, security and fraud; and wraps up with technology projections. It takes a day and costs $225. It's typical. And, for many managers, it's useless.

These programs start out with the best of intentions. They are taught by qualified instructors. And they are motivated by real problems. But they are the wrong solution to the problem, because they do not address the management issues.

It is true that managers do many things. Managers develop budgets, and computers can be a useful budgeting tool. Managers schedule projects, and computers can help create Pert and Gantt charts. Managers read memos, and computers can move memos quickly. But developing a budget, scheduling a project and reading memos are not managing. If managers — people whose primary job is accomplishing organizational goals through other people — can use computers for some of their other tasks, that's fine. But this does not make computers management tools.

There is nothing wrong with learning how to use a spreadsheet or a budgeting package. Managers who perform these tasks will probably find these skills useful and should probably learn them. In the process of learning these skills, they should also get some general background in computers. But, in their role as managers, these tools are not useful. The management world does not need more spreadsheet jockeys or entry-level Basic programmers.

What, then, is management's computer problem? The most important problem in a large organization is that people usually don't know how to use information well. Managers often don't understand where information comes from, how it's updated or how it's manipulated. Sometimes they don't even understand how accurate a piece of information is in a given situation, what factors affect its accuracy and what the trade-offs among these factors are. They can't set, evaluate or even understand an information policy. They can't tell if an action is consistent or inconsistent with a policy. If told that it is inconsistent, they can't decide if the action, the policy or both ought to be changed. In short, they often do not know how to manage information as a resource in the same way that they manage people, inventory, machines, money or any other corporate resource.

**MANAGEMENT MATRIX**

***The management world does not need more spreadsheet jockeys or entry-level Basic programmers.***

The solution to this problem is information literacy. Teaching information literacy would begin by changing managers' mental attitudes toward information: It is not a mystery reserved for initiates, but a resource that can be managed by ordinary people. Managers need some understanding of computers, but less than most technical specialists would have us believe. I can see droves of letters to the editor from insecure computer experts who don't want their users to find this out.

Once the managers have the right attitude and the technical readiness, they can learn to manage information and information policies. A proper information literacy program would begin by looking at input — paper or screen — and output — again, paper or screen. Where does the input come from? What can go wrong in the process of getting it into the computer? What can be done about these pitfalls? What happens to it in the computer? Where and how is it stored? How does other information in the computer relate to it? (At this point the participants would look at their organizations' data definitions and data dictionaries.)

How is the information processed and transformed in the computer? What can go wrong while it is there? How does it become output? And what can go wrong in this part of the process? Given what we want to happen and what can go wrong, what policies make good results more likely? How do these policies compare with those the organization now has? Are the current policies reasonable — from the manager's viewpoint, the individual professional's viewpoint, top management's viewpoint and the MIS department's viewpoint? What, if anything, should be done about them?

Information literacy training addresses the hard management issues that major computer users face. It's not as easy as computer literacy training. The instructor has to know more than bits, bytes and a few individual applications.

Information literacy is more important. It addresses organizational effectiveness, not just organizational efficiency.

*Mallach is associate professor of computer science at the Boston College School of Management and a consultant to top managers of vendor and user organizations.*

## Managing data from a corporate perspective

By JEFF D. VOWELL JR.

As the field of data processing has developed over the last 20 years, it has progressed from the two or three programmers who did everything in support of their companies — from running the program they wrote to delivering the output — to the extremely specialized requirements that exist today. There now exists a specialist for every part of the DP activity — communications, operations, documentation, manufacturing systems, data base administration, office automation, laser printing, decision support and so on. This results in having many small groups of individuals possessing tremendous knowledge in a particular area or function with little knowledge of any other area and unfortunately no knowledge of the big picture. Of course, we can all say, "Well, that is a management function." And it is supposed to be a management function. But unfortunately, most of the managers of those people suffer from the same tunnel vision that the people they supervise do.

**READER'S PLATFORM**

***The information resource manager has to have the technical knowledge and ability to understand what each area is doing and to keep from being snowed by the jargon.***

This situation has resulted in application systems that do not satisfy the end user's requirements, system designs and implementations that do not run, rampant rewrites and modifications, overwhelming backlogs, systems that misuse resources and many other problems.

What can be done about this? There has been much talk about the information resource manager — the person who would manage data from a corporate view. The function of this person should be expanded to include a total corporate DP quality assurance and design review function.

This person should be a "technical generalist" — the type of person who can analyze the business requirements of the corporation and integrate those with all the various DP technical specialties. This person has to have the technical knowledge and ability to understand what each area is doing and each area's goals and to keep from being snowed by the jargon. Then he must be able to evaluate and resolve the systems integration issues between each of these groups. Then comes the hard part. He must be able to evaluate the trade-offs between what the corporation's business needs are and the cost of satisfying those needs using DP.

This person will not be easy to find. He must have a background in systems design, programming, user interfaces, consulting, technical support, user support, management, operations and definitely an appreciation and understanding of business, because at the bottom line, the business is what keeps DP in business.

These people are out there. They are the ones who are concerned about doing things the the right way. They want and enforce standards. They seem to have the ability to get tasks accomplished quickly and also seem to have the innate ability to discover flaws and fix them. They also make every attempt to keep up with what is happening in this ever-changing industry and refuse to fall into the pit of apathy. And then, because they find that most corporations really do not have a spot for them or cannot keep up with them, they have a tendency to leave. People in the business side of management are called "fast trackers" and are wanted by corporations. In data processing, they are needed even more, because very few people can combine the overall picture in a field that requires such a close interface between business and technical requirements.

The position itself must report at a very high level, at least to the top person in DP, and preferably to the general manager or president.

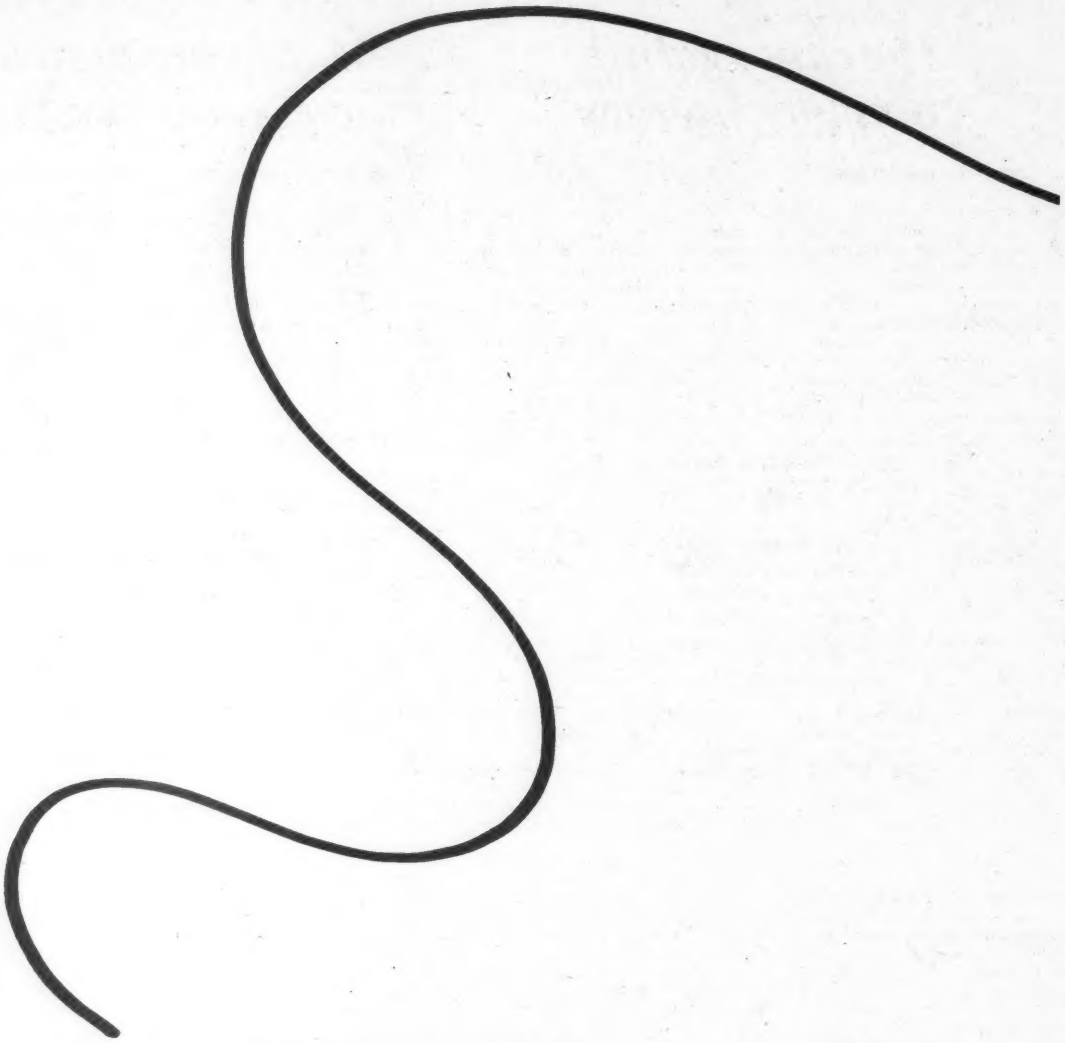
Many companies have implemented parts of this concept in the form of design review or quality control functions, but they are usually at too low of a level to make any dramatic or long-term impact and often find themselves shackled because of a lack of commitment from a high enough level or by a lack of understanding from management suffering from tunnel vision.

In conclusion, we hear continually about systems that do not work, about non-DP people giving up on corporate data processing and going to personal computers, about the need for greater programmer productivity, about the need for better decision support systems and user support, about DP management complaining of loss of control, about non-DP management complaining about data processing not providing them with what they need and so on.

The key to solving much of this is just to pull it all together. All of the specialists are wrapped up in their own little worlds. Corporations spend a large amount of money for the data processing function, which is essential for their survival and competitiveness.

Let's see some of the many corporations out there implement positions and functions for these technical generalists and allow them to get in and pull it together for the benefit of the corporation as a whole.

*Vowell is a computer systems consultant with Vowell Systems Group in Middletown, N.J.*



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# COMMUNICATIONS

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## Caring for the hybrid net

**SECOND** OF TWO PARTS

I've talked about what a hybrid network is and about the forces that are moving business users toward hybridization and away from a one-application, one-network system. Now I'd like to talk about planning for and implementing a hybrid network.

Justifying a hybrid network is usually less a matter of hard dollar figures than of professionally judging that it is better to have such a net than not. Anybody can cook up some numbers, but in many cases, it is obvious that the numbers have been cooked. These kinds of networks are brought in for fundamental strategic reasons: to provide connectivity throughout the company or to provide a strategic edge in competing with other firms in the industry.

A financial analysis is done as a kind of a check to make sure that it is sensible. It is like buying a house. You do all the calculations to figure out if you can afford it, but the real question is, Would we really like to live in this house?

Planning for a hybrid network installation must be flexible by definition. Initially, you try to find out what your communications needs are going to be. The problem is that most companies cannot get solid information about what their users' network requirements are going to be like after a year.

You then try to make some statements about the nature of the flexibility you are going to need in the future,

See **CARING** page 22

*McQuillan is president of McQuillan Consulting Co. in Cambridge, Mass.*

# Modem standard on hold

## Gains and setbacks add to industry's confusion

**By Elisabeth Horwitt**

Recent developments have added still more confusion to an already chaotic 9.6K bit/sec. dial-up modem market. V.32 specifications, recommended as an industry standard by the Consultative Committee on International Telephony and Telegraphy (CCITT), gained some ground last month when Concord Data Systems Corp. started shipping in quantity the CDS V.32 Trellis modem, priced at $3,495.

British Telecom also is reportedly shipping a V.32 product. Codex Corp., while making no formal announcement, recently began hinting that it may be announcing a V.32-compatible product in the next month or two. And industry rumor has it that AT&T will be announcing a V.32-compatible product at the Interface '86 show in Atlanta this month.

But the V.32 standard has also suffered some setbacks. NEC America, Inc., after demonstrating a V.32-compatible modem at the Communication Networks '86 conference in January, recently withdrew the product and refused to name a shipping date. Fujitsu America suffered a similar setback.

According to one spokesman, the vendor is working on a more cost-effective implementation of the V.32 technology that it hopes to ship by early next year.

The last few weeks also have seen advances among what one modem vendor spokesman termed the "oddball offerings" — 9.6K bit/sec. modems that do not conform to an industry standard. U.S. Robotics, Inc. released technical specifications for a proprietary 9.6K bit/sec. modem that it hopes to begin shipping in late summer. Digital Communications Associates, Inc. has increased the speed of its asynchronous modem Fastlink and added several new features as well.

There is great potential demand for reliable, 9.6K bit/sec. dial-up modems, according to The Market Information Center, Inc., in Marlboro, Mass. The "optimal"

See **MODEM** page 23

# Sytek offers local network link, sells upgraded net adapter card

**By Peggy Watt**

MOUNTAIN VIEW, Calif. — Sytek, Inc. last week announced both a new gateway product to link its diverse local-area network systems and its plans to market a version of the IBM Personal Computer Network Adapter Card. The company is also launching a certification program for developers who want to guarantee that their software is compatible with Netbios.

The Sytek 6140 Internetwork Bridge will enable personal computer users to link with asynchronous and 3270 network systems for file transfer or terminal emulation. The bridge is compatible with Sytek's System 2000, a broadband local-area network annnounced in January; Localnet 20, Sytek's original broadband network; and System 3000/7000, a 3270 terminal network announced in December.

The product supports multiple sessions and features menu-driven routing control and built-in recovery for power failure. It will be available in the third quarter of the company's fiscal year, a Sytek spokeswoman said.

The Sytek 6120 Network Adapter Card, available in April, is an upgrade of the Sytek 6110 Network Adapter Card originally designed for the IBM PC Network. The new card features 50% faster session-level throughput along with IBM Netbios compatiblity. A future release will support APPC/PC LU 6.2. Prices range from $439 to $595, depending on quantity.

Sytek's System 6000 Starter Kit, selling for $2,539, includes four Network Adapter Cards, a 6051 Network Translator, IBM PC Network software and cabling.

See **SYTEK** page 23

## NEW THIS WEEK

- Case Communications introduces its DCX 812M multiplexer

For more on this and other new products, see pp. 75-96.

## INSTANT ANALYSIS

*'Most packet switches on the market today use a technology that is 8 to 10 years old. For instance, GTE Telenet switches use the Mostek 6502, the same chip that drives the Apple IIs. And converting to a more modern technology would be extremely costly.'*

**— Paul Bell, president, the 23K Group, Inc., a New York consulting company**

# Banks, retailers hope to cash in on consumer debit cards

## Point-of-sale problem expected to be resolved

**By Charles Babcock**

ORLANDO, Fla. — A task force of the American Banking Association (ABA) is expected to recommend a set of standards on debit cards later this year, a move that could open the door to a new wave of computerized, consumer banking.

At the ABA conference held the week of Feb. 10-14, Stanley Paur, executive vice-president of Financial Interchange, Inc. of Houston, the operator of a large electronic fund transfer network, said, "1986 looks like the year of deployment, and 1987 will be the year that transactions in volume materialize."

The banks see debit cards as "a logical extension" of automated teller machines (ATM), said William Petrarca, vice-president of the National City Bank of Cleveland, which will conduct a debit card market test in Dayton, Ohio, in April.

In many cases the plastic identification cards that serve as a consumer's key to the ATM could also serve as a debit card for point-of-sale purchases. The consumer would enter his bank account number at the retailer's terminal. The amount of the purchase would be automatically withdrawn from the consumer's account and deposited directly into the retailer's account, eliminating much of the delay associated with check and credit card transactions.

The banking community is strongly behind the debit card movement, according to a Big Eight accounting firm representative who did not wish to be identified. "There's a tremendous amount of money to be made handling these transactions, and the banks want to get there first," he said.

He added that banks fear that if they do not move quickly, a savvy retailer with its own national computer network, such as a J. C. Penney Co. or Sears Roebuck & Co., will beat them to it.

But the banking community may be underestimating merchants' resistance to the new system, especially because they will have to install expensive new terminal and communications equipment.

Retailers will have to invest millions of dollars in new equipment capable of reading the magnetic stripe on a debit card and automatically calling the correct electronic funds network to complete the transaction. In addition, they will have to purchase personal identification number pads or calculator-type keyboards that allow a customer to enter his identification number, which authorizes the transfer of funds out of his bank account. And the new terminal systems will have to incorporate printers that give the customer an instant receipt for the transaction.

A similar outlay will not be required of banks, whose officials claim that debit card transactions can be handled on the same networks

See **DEBIT** page 22

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# Caring for hybrid net

From page 19

about what kind of change or growth will take place. Perhaps you write down some goals for the network.

Then what we as network consultants have often done is to examine the key technical alternatives and try to define the overall network architecture by answering a number of basic questions. The questions are different for each company, but typical ones include the following: What are we going to do about sharing T1 transport? What are we going to do about combining private transmission with carrier transmission? Are we going to try to combine IBM's Systems Network Architecture and CCITT's X.25?

Then there is the matter of choosing vendors. We have found that it is possible to contract with one carrier to do everything when dealing with the most basic facilities or services such as raw transport. This gets to be a less and less reliable approach as you get to higher functions such as packet switching or network statistics gathering and monitoring and so on.

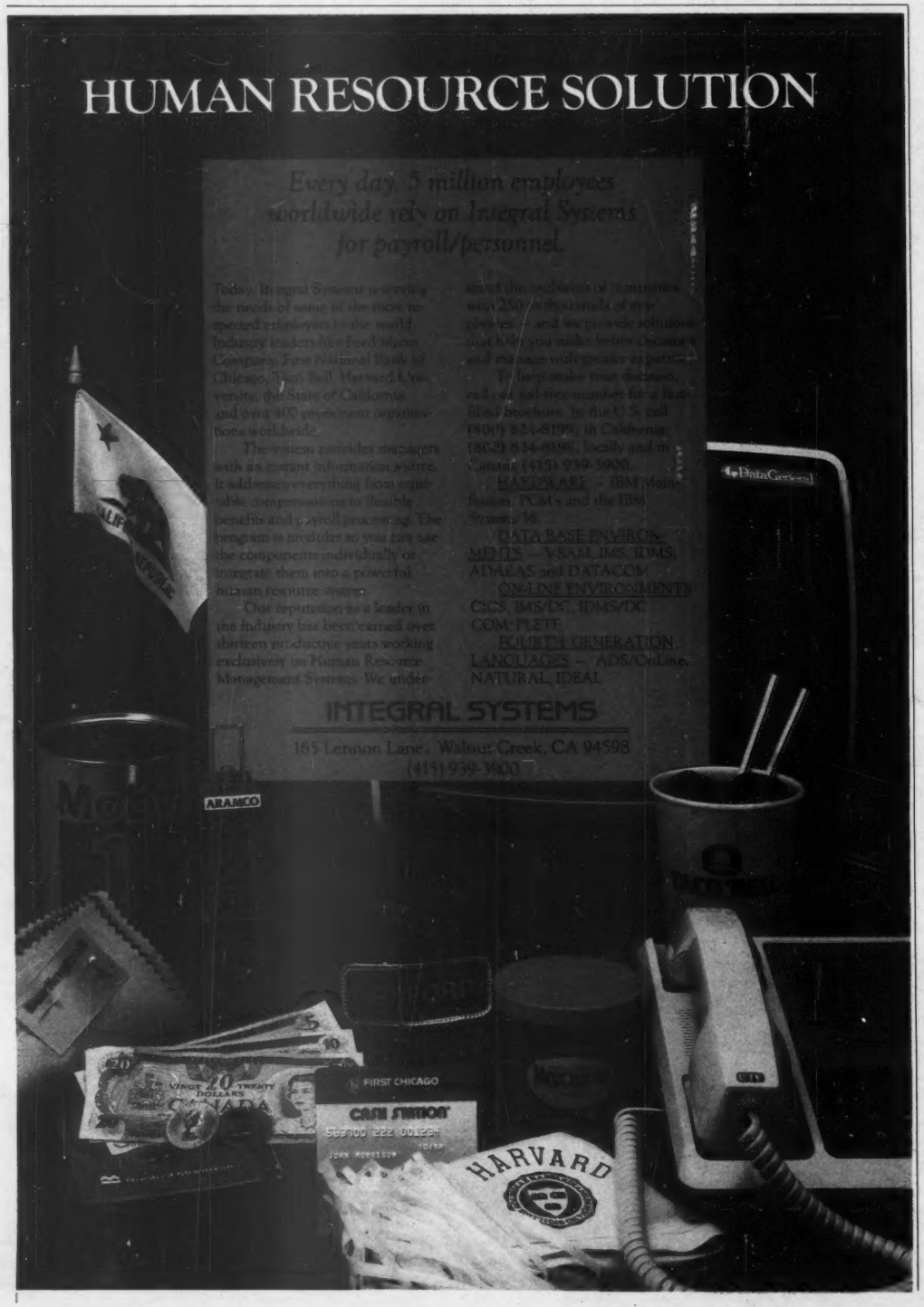
A carrier that is acting as your primary vendor and sourcing all the different packet switches and monitoring and control centers from other companies will not have nearly as much expertise in those higher levels of protocol and troubleshooting as the ultimate suppliers. So, you get a situation in which a fairly knowledgeable user is asking a fairly uninformed vendor a detailed question about a problem.

In the end, it is up to user organizations to realize the importance of network assets and to take control of their communications destinies. It is true that you need additional network management tools if you choose to manage your own facilities rather than allow a vendor to do it for you. And unfortunately, the tools to build, manage and maintain a seamless hybrid network are not yet all there.

There is one important development that will make things easier in the future. What will really make a difference is the transfer of responsibility and expertise from the telephone companies to the user community.

That is happening right now. User companies keep getting smarter, they are increasing staffs, they are training people. Users that have to do this on a large enough scale are becoming their own miniature telephone companies, and they are either growing or acquiring the talent to do it.

Making hybrid networks work is partly a technology problem, but more fundamentally, it is a people problem.




# Debit cards spark hopes

From page 19

that now carry ATM-generated fund transfers between different banks.

### Handling costs at issue

Retailers also may resist the idea of having to pay debit card transaction handling costs, which have been estimated at 9 or 10 cents per transaction. The banks, which would handle thousands of such transactions each day, want to charge retailers a fee. One resolution to this debate is to let consumers pay handling costs.

Barry W. Lawson, senior vice-president of First National Bank of Atlanta, which has launched its own debit card business, said the credit card companies and banks, although eager to get into the debit card business, are proceeding cautiously.

Visa U.S.A., for example, after struggling with an 18-month introduction of a debit card that failed to arouse much consumer interest, is now talking to Mastercard International about a joint venture to create an independent national company to issue debit cards, according to Visa officials.

One vital question still to be answered is whether the system will be adopted by a sufficient number of consumers. Jean W. Gormly, the manager of publications for the Electronic Funds Transfer Association, pointed out, "If you have 30 days of free credit from your credit card, who needs a debit card?"

# Modem standard on hold

From page 19

transmission rate cited by 36% of Fortune 1,500 corporations surveyed last fall was 9.6K bit/sec., according to the research company. Approximately 16% chose 4.8K bit/sec., another 16% chose 1,200 bit/sec., and 14.6% chose 2,400 bit/sec.

Potential buyers, however, may be discouraged by current lack of standardization. The CCITT has urged the adoption of V.32 specifications for symmetrical, full-duplex transmission — 9.6K bit/sec. both ways at once — over one twisted-pair line. But many vendors are opting for proprietary solutions.

Michael Moritz, Codex Corp.'s director of dial-up products, pointed out that the more modem products adhere to V.32, the more connections such products make possible. "That's especially important in the dial-up world, when you have less control over whose equipment you have to link up with," he said.

The newness and complexity of the V.32 technology may be slowing down adoption of the standard by vendors and users. Moritz admitted that V.32 is "the most difficult modem technology ever to be built." He added that the crucial feature is echo cancellation, which allows 9.6K bit/sec. transmission to take place in two directions over the same telephone line bandwidth by preventing outgoing signals to interfere with incoming signals at either end.

"V.32 specifications say, 'Use echo cancellation,' but they don't say how," Moritz said. He added that some products are not designed to deal with echoes that arise from transmission delays over distance, particularly over satellite links.

The V.32 modem's $3,500 price tag also may discourage potential customers, particularly microcomputer users. "I can't conceive of companies wanting to buy a $3,500 modem for a $1,500 PC," according to U.S. Robotics spokesman Mark Smith.

U.S. Robotics is one of several vendors that have chosen to develop proprietary asymmetrical full-duplex modems that support 9.6K bit/sec. in one direction and 300 bit/sec. in the other. According to Smith, dial-up line bandwidth can "just barely" support both speeds without overlap. This avoids the complexity and expense of echo cancellation. U.S. Robotics' product will cost approximately $1,000, the company said.

One nonstandard product that has drawn a lot of fire from other vendors is Fastlink, an asynchronous, asymmetrical full-duplex modem marketed by Digital Communications Association at $1,195 for a board and $2,395 for a stand-alone system.

Although most 9.6K bit/sec. modems compress the entire transmission into one section of the dial-up line's bandwidth, Fastlink spreads the transmission throughout the total bandwidth. According to Digital Communications technical specialist Dodge McCord, this enables the modem to transmit at 10K bit/sec. — combined rate for both directions — "while avoiding noise interference and other problems that V.32 modems encounter on dial-up lines." This week, the vendor announced that Fastlink can now transmit at up to 18K bit/sec.

Fastlink uses "adaptive duplex" mode, shifting speeds according to the type of transmission. Newly released firmware optimizes packet size for the type of transmission. The vendor also announced Fastlink compatibility with V.22 BIS 2,400 bit/sec. specifications.

According to Barry Gilbert, vice-president of The Market Information Center, the 9.6K bit/sec. dial-up industry still needs to prove itself. "Industries that require interactive data communications such as funds transfer and airline reservations cannot afford transmission errors. Those companies will stick with leased lines because their telecommunications managers will say to themselves, 'Why should I put my job on the line just to save a few dollars?' "

# Sytek offers local net link

From page 19

Sytek said it hopes that the announcements, coupled with its continuing specialization in large network installations, will help offset the negative effects of its recent relationship with IBM. Industry analysts have said that IBM lost interest in marketing Sytek's PC Network hardware when the vendor brought out its own token-passing network.

Sytek is precluded from selling commercially the PC Network card it still supplies to IBM.

Network industry analysts said Sytek is taking the right steps toward maintaining a separate identity out of IBM and the PC Network's shadow. "They're becoming a very formidable force," said Harvey Freeman, vice-president of Architecture Technologies Corp. in Minneapolis, pointing to Sytek's large installed base of broadband networks.

Eric Killorin, publisher of "PC Netline" in Handover, Mass., said Sytek still faces a long walk out of IBM's shadow. "There's nothing wrong with being IBM PC Network compatible, but it is smart to be branching out into other IBM networks, not just PC Network."

The IBM contract had always been viewed as temporary, according to Jeffrey Tonkel, Sytek's marketing director. "It was good for us, except for the way the financial community perceived us."

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# SOFTWARE & SERVICES

**SOFTALK**
John Gallant

## Puzzling over productivity

Is there a single product solution to the applications development crisis?

Can there ever be a single-product solution?

Are all the pieces available to allow users to construct a multitool solution to the development problem?

Is a multitool approach an effective way to deal with the applications development and maintenance work load?

Are these questions familiar to you?

If so, you're hardly alone. You're a member of the growing community of DP professionals who are finding it more difficult these days to see the development forest for the productivity tool trees.

Several times a week, it seems, another vendor announces another product that promises to automate the entire life cycle of applications development, from design to maintenance. The tools, which generally have little impact on the existing base of operational systems, are touted as "obsoleting" traditional development methods. They obsolete time-consuming manual design, old-fashioned hand coding and inefficient, back-breaking maintenance techniques, the marketing literature intones.

If the product isn't a complete applications development foundation, the vendor is quick to point out that it is a key tool that, combined with products X, Y and Z, can quickly winnow even the largest applications backlog.

Yet, despite the availability of a bewildering array of tools, most software development is still conducted according to the traditional methods the vendors decry.

But what's a manager to do? In its own way, each tool seems limited. The tool is either sophisticated enough for

See **PUZZLING** page 32

*Gallant is* Computerworld's *senior editor, software & services.*

# Multivendor Disoss net delivers Boeing's E-mail

**By Clinton Wilder**

NEW YORK — Using IBM's Distributed Office Support System (Disoss) as the communications backbone in a multivendor environment can be both challenging and successful, the top office automation manager for Boeing Computer Services Co. said at a recent conference.

Speaking at the Yankee Group's "IBM's Master Plan 1986-1991" conference, K. Robert Johnson, manager of BCS's office architecture and development group, said Boeing has one of the world's largest Disoss installations. Supporting three data centers in Washington state as well as Boeing divisions in Philadelphia, Wichita, Kans. and Vienna, Va., Boeing's Disoss-based electronic mail system — called Boeing Information Exchange — links a considerable range of different vendors' hardware and communications protocols.

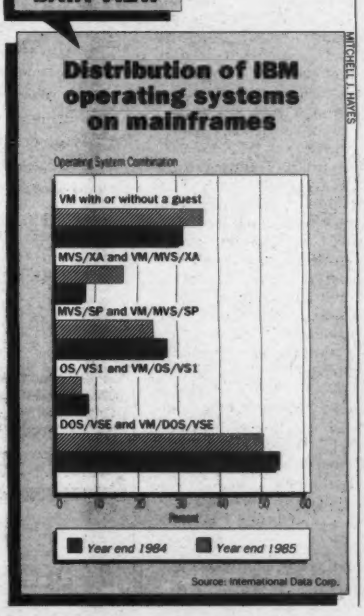
To make it work effectively, Boeing programmers had to develop a variety of software interfaces to Disoss, Johnson said. "It has involved a lot of trial and error and still has many shortcomings," he said. "Multivendor Disoss networks are complex and require substantial commitment. But we at Boeing still feel it is the only product in the foreseeable future that will have broad multivendor commitment. We've hitched our wagon to it."

In addition to developing interfaces to Wang Laboratories, Inc. and Xerox Corp. word processors and Hewlett-Packard Co. file servers, Boeing's developers also had to build links among various IBM hardware and software products. Johnson said he considers IBM a "single multivendor" because of the need to build his own bridges within the IBM world.

"The System/36, System/38, 8100 and 370 architectures may all have the IBM name, but they were all developed in different parts of the company and can't al-

See **DISOSS** page 32

**DATA VIEW**




# DEC program development tools debut

**By Charles Babcock**

Digital Equipment Corp. recently announced three software products for program development, information management and decision support.

The VAX Cobol Generator is an icon-based program development tool that produces standard source code Cobol from diagram charts for VAX programmers. Running on systems ranging from the Microvax II to the VAX 8800, it may be used both to create new programs or to convert existing ones into standard Cobol, said company officials at Decworld '86, a company-sponsored show in Boston.

The generator will run on any VAX using Version 4.4 of VMS and Version 3.3 of VAX Cobol to compile the code. Available in late spring, it will be licensed for $18,000 a year and will be available on the VAX 8200, 8300 and 8800 systems under

See **DEC** page 30

## INSIDE

Fusion Products International offers the first SQL implementation for IBM's System/38/**26**

Group Operations unveils a new release of its Superstructure Cobol program restructuring facility/**26**

## NEW THIS WEEK

- Lattice offers Lattice C compiler Version 3
- Phase Linear Systems upgrades Plsort VMX

For more on these and other new products, see pp. 75-96.

## INSTANT ANALYSIS

*"IBM was being pressured by its blue chip user base. We're beginning to see the relational DBMS products as engines driving a broader range of applications."*

**— Ron Ross, editor of the "Data Base Newsletter," on the expanded range of applications supported by the enhanced version of IBM's DB2 data base management system**

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# Enhanced restructuring tool debuts

## Product also traces program logic flow

WASHINGTON, D.C. — Group Operations, Inc. has unveiled a release of its Superstructure Cobol program restructuring tool that allows users to restructure programs that have already been processed through the product.

According to Henry Morgan, vice-president of Group Operations and developer of Superstructure, Release 5 allows users to restructure systems that have degraded since first being maintained with Superstructure. Morgan said that during routine maintenance, or when enhancing a restructured program, it is not uncommon for unstructured code to be used.

"Almost every company we talked to initially was concerned about being able to restructure programs only once and then not being able to do it again. They did not have confidence that programs would remain structured," Morgan said.

Another enhancement in Release 5 is the option to reorganize program modules in top-down executional sequence. "We use a technique of organizing the code functionally, as opposed to organizing by level of control," Morgan said. The enhancement allows users to trace a program's logic flow more easily.

Superstructure is available for IBM mainframes under standard operating systems. A perpetual site license costs $33,000.

— Eddy Goldberg

# Fusion announces first SQL System/38 implementation

LARKSPUR, Calif. — Fusion Products International, Inc. has announced what it said is the first implementation of IBM's SQL for the System/38. The product, Fusion/QL, is a nonprocedural query language that is based on SQL and uses the native System/38 command editor.

It works either in a standalone mode or as an interface to Fusion/4, the company's menu-driven report/query generator for the System/38. According to Michael Malloy, director of marketing, both Fusion/QL and Fusion/4 share the same data base, allowing a user to call up a report through the menu system even though it was created by a DP user through the nonprocedural method.

Release 1 of Fusion/QL will be available for current Fusion/4 users in April. The price will be in the $4,500 to $7,000 range, Malloy said. Full commercial distribution is set to begin in third-quarter 1986 with Release 2.

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# Integrated CADD/CAM package out

IRVINE, Calif. — Manufacturing and Consulting Services, Inc. has released Anvil-5000, fully integrated computer-aided design, drafting (CADD) and manufacturing (CAM) software that supports each step in product creation, from inital design to automated manufacturing. The package runs on 32-bit virtual memory computers.

The product allows information from wire frame, surface and solids modeling modules to be completely integrated with design, drafting, finite element mesh and automated manufacturing modules through a single data base, according to the manufacturer.

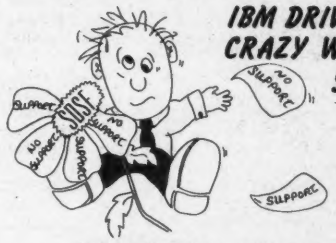
Anvil-5000 is reportedly optimized for both mainframes and 32-bit workstations, including Apollo Computer, Inc.'s Domain system, IBM's RT Personal Computer and most systems from Digital Equipment Corp., Data General Corp., Hewlett-Packard Co. and other IBM systems.

### International user interface

The package is compatible with most major networks, and international user interfaces are available in a number of languages, including American and British English, French, German and Japanese, according to the the company.

Manufacturing and Consulting Services has primarily been a vendor of turnkey systems and computer-independent CADD/CAM software, which it licenses to other companies for direct use or resale.

Anvil-5000 has six software modules available in 12 configurations. The product comes with with installation assistance and instruction starting at $10,000.



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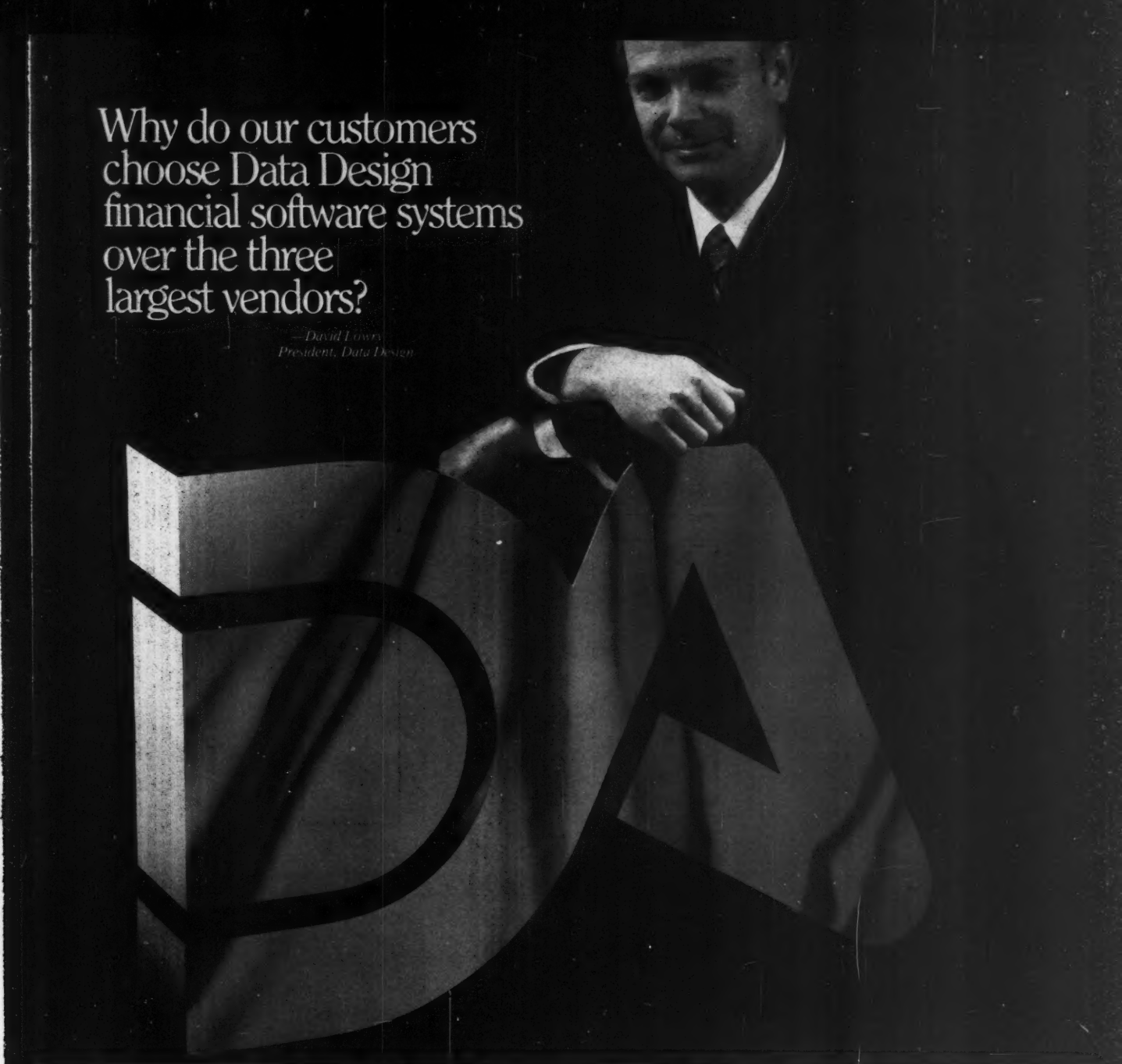
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# Expert development system for Cobol programs announced

## Generates code from design parts

By John Gallant

SCOTTSDALE, Ariz. — Transform Logic Corp. recently unveiled an IBM mainframe applications generator that reportedly uses expert system technology to produce Cobol systems.

The Transform development system automatically generates structured applications in standard IBM Cobol code from preliminary design elements entered by an analyst, said Roger Philips, president of Transform Logic. Philips said early users have benefited from a significant reduction in the amount of time required to generate complete systems.

According to Philips, Transform consists of two components. The Schema Management System (SMS) operates as an on-line CICS or IMS/DC application and allows a designer to specify and store a variety of design elements. SMS acts as a data base for such elements.

The Application Management System (AMS) is an expert system that generates the application from elements in SMS, according to Philips.

AMS is a forward-chaining, rule-based system that features a knowledge base of more than 200,000 rules that capture expertise in applications development. AMS, he said, ensures that generated systems are structured and efficient.

AMS can generate whole or partial applications, Philips said, and can be used to develop prototypes or to test the effect of individual design elements on the application. Maintenance is reduced because modifications to elements in SMS can trigger regeneration of applications. The Transform system is priced from $225,000.




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# DEC offers program tools

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DEC's periodic payment licenses with an initial fee of $3,600 and monthly payments of $720.

Programmers will be able to draw diagrams to create or modify programs using icons that represent various standard program components. After choosing all the elements, the generator converts the icons into source code, said Shirley Ann Stern, product manager. Either cursor keys or a mouse may be used in the icon selection.

DEC also introduced tools for developing end-user applications. The VAX Rally application development tool is designed to generate forms and reports in financial planning, personnel and project management. The system provides a programmer with a menu-generation facility to construct a variety of end-user menus. VAX Rally runs on the VAX and Microvax II lines under VMS and MicroVMS systems and is priced from $5,600 to $56,000.

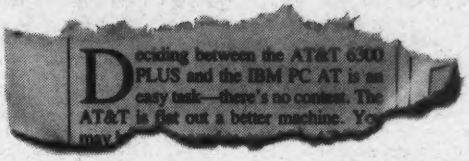
VAX Teamdata is an end-user information access tool that provides an interface to DEC business applications, All-In-One Office functions — such as calendar management, time management, word processing and electronic mail — and DEC's Information System.

End users can utilize these applications through Teamdata or extract information from them for use in a form or report being generated through VAX Rally.

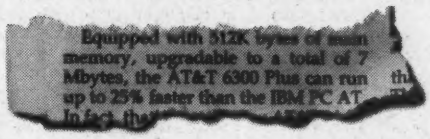
Teamdata is based on VAX RDB/VMS relational data base and the VAX Information Architecture. Users may also issue DCL commands and run DCL command procedures from within VAX Teamdata.

VAX Teamdata runs on the same systems as VAX Rally and is priced from $1,400 to $14,000.

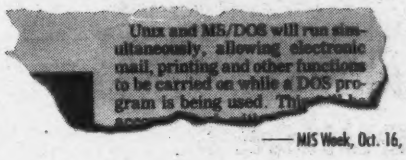
Both VAX Rally and Teamdata will be available in June.



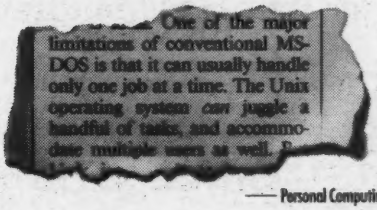

— PC Magazine, Feb. 25, 1986*



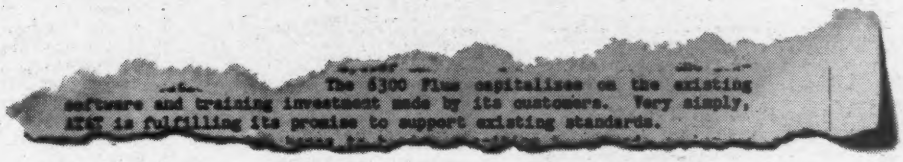

— Information Week, Oct. 14, 1985




— MIS Week, Oct. 16, 1985




— Personal Computing, Dec. 1985



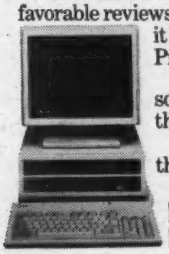

— Yates Venture, Oct. 1985

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# Puzzling over productivity

From page 25

programmers or simple enough for end users. If it is aimed at both audiences, it probably can't be used to develop the full range of applications that corporations need today. Some tools are great for production systems but are too complex to be used for ad hoc systems or simple applications. (Employing them for simple reports or applications would be like ridding the backyard of mosquitoes with antiaircraft weapons.) And just try building an efficient operational system with an end-user-oriented tool.

That management is hesitant about investing in current tools is hardly surprising. The prior generation of fairly expensive productivity products gathers dust on the shelves of many shops. A piecemeal strategy seems ineffective, and users are leery about investing in costly life-cycle-oriented systems that may not perform as promised or that may be left behind by technological advances hiding just around the corner or by the moves of industry leaders like IBM.

Even powerful relational data base management systems associated with rich fourth-generation languages have been shown to have their limitations as development bases.

There is no doubt that the vendors of the above-mentioned tools will take umbrage to this discussion. Each feels that its product is either a total solution — wouldn't it be nice if that word had never left the domain of chemists? — or an important piece of some overall strategy.

This is not intended as criticism of the vendors, many of which provide good, useful products. But even if the vendors are absolutely correct in the beliefs reflected in their marketing literature, a more important issue remains. Will the current tools, even the most sophisticated, allow users to take full advantage of the great leaps in hardware technology to come? Will they allow users to apply effectively new technologies or new methods in software development? In short, will the investment in current tool technology provide a solid foundation for applications development of tomorrow?

It is clear that software development has to take a quantum leap into the future. Hardware technology has already left software in the dust, and the gap between hardware and software is still growing. And therein lies the dilemma for users.

### Salvation not imminent

DP managers cannot afford to forgo current products in the hope that development salvation, in the form of radically different software building tools, is around the bend. But they are leery of embracing any of the current traditional methods obsoleting tools that may be obsoleted themselves in a year or two. (Indeed, that hesitancy and the problems involved in development may be at the heart of the recent doldrums in the computer industry.)

DP management seems to be desperately seeking some insights into where software development technology is moving. Users need to step back from the fray, or step up as the analogy dictates, to some vantage point from which they can view the whole of the development forest.

Users need to assess the horizon of development technology carefully, however distant and indistinct it may be. Only through such careful consideration can users select the tools that will serve as a solid foundation for current and future development efforts.


# SAS Institute Inc. Announces

## Lattice C Compilers for Your IBM Mainframe

**Two years ago...**
SAS Institute launched an effort to develop a subset of the SAS® Software System for the IBM Personal Computer. After careful study, we agreed that C was the programming language of choice. And that the Lattice® C compiler offered the quality, speed, and efficiency we needed.

**One year ago...**
Development had progressed so well that we expanded our efforts to include the entire SAS System on a PC, written in C. And to insure that the language, syntax, and commands would be identical across all operating systems, we decided that all future versions of the SAS System—regardless of hardware—would be derived from the same source code written in C. That meant that we needed a C compiler for IBM 370 mainframes. And it had to be good, since all our software products would depend on it.

So we approached Lattice, Inc. and asked if we could implement a version of the Lattice C compiler for IBM mainframes. With Lattice, Inc.'s agreement, development began and progressed rapidly.

**Today...**
Our efforts are complete—we have a first-rate IBM 370 C compiler. And we are pleased to offer this development tool to you. Now you can write in a single language that is source code compatible with your IBM mainframe and your IBM PC. We have faithfully implemented not only the language, but also the supporting library and environment.

Features of the Lattice C compiler for the 370 include:

- **Generation of reentrant object code.** Reentrancy allows many users to share the same code. Reentrancy is not an easy feature to achieve on the 370, especially if you use non-constant external variables, but we did it.
- **Optimization of the generated code.** We know the 370 instruction set and the various 370 operating environments. We have over 100 staff years of assembler language systems experience on our development team.
- **Generated code executable in both 24-bit and 31-bit addressing modes.** You can run compiled programs above the 16 megabyte line in MVS/XA.
- **Generated code identical for OS and CMS operating systems.** You can move modules between MVS and CMS without even recompiling.
- **Complete libraries.** We have implemented all the library routines described by Kernighan and Ritchie (the informal C standard), and all the library routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly. Especially significant is our byte-addressable Unix®-style I/O access method.
- **Built-in functions.** Many of the traditional string handling functions are available as built-in functions, generating in-line machine code rather than function calls. Your call to move a string can result in just one MVC instruction rather than a function call and a loop.

In addition to mainframe software development, you can also use our new cross-compiler to develop PC software on your IBM mainframe. With our cross-compiler, you can compile Lattice C programs on your mainframe and generate object code ready to download to your PC.

With the cross-compiler, we also offer PLINK86™ and PLIB86™ by Phoenix Software Associates Ltd. The Phoenix link-editor and library management facility can bind several compiled programs on the mainframe and download immediately executable modules to your PC.

**Tomorrow...**
We believe that the C language offers the SAS System the path to true portability and maintainability. And we believe that other companies will make similar strategic decisions about C. Already, C is taught in most college computer science curriculums, and is replacing older languages in many. And almost every computer introduced to the market now has a C compiler.

**C, the language of choice...**
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# Disoss net delivers Boeing's E-mail

From page 25

ways talk to each other through Disoss," he said.

### Users concerned with data integrity

Johnson said his users' primary concern with Disoss is the fidelity, or integrity, of various document types as they move through the network. He said Disoss did not adequately support users of IBM's Professional Support 370, who subsequently implemented IBM's alternative Professional Office System (Profs) environment.

And because Boeing used Digital Communications Associates, Inc. Irma boards instead of IBM's proprietary coaxial boards for its microcomputer-to-mainframe connections, there was no smooth Disoss connection to IBM Systems Network Architecture.

In most cases, Johnson has found that the best way to overcome the shortcomings of Disoss is a do-it-yourself approach. "Commercial interfaces may become available, but the vendors are developing them as developers, not users," he said. "They may not understand all of the user needs."

### Boeing overcame problems

Since installing Disoss in 1983, Boeing has successfully overcome many obstacles, Johnson said, including technical difficulties and lack of support from IBM.

With considerable in-house expertise and effort, he said, Boeing has molded the IBM system into a solid underpinning of its information exchange network.

"Our early experience was negative, but over time, Disoss has become very reliable," Johnson maintained.

# MICROCOMPUTERS

**SMALL TALK**
Eric Bender

## The concerted Kurzweil effort

When Raymond Kurzweil's various inventions appear one-by-one on stage, the music synthesizer made famous by Stevie Wonder is the showstopper. This is the jazziest of his creations — in fact, a demonstration two weeks ago at the Boston Computer Society monthly meeting featured a six-part jazz improvisation — and it attracted the most questions from the audience.

Synthesized music strikes some like light beer — it's *almost* as good as the real thing — but Kurzweil made a strong case for the music's versatility and value for the buck. And he claimed that in the future, "a digital piano will sound better than an upright piano, because the digital piano is modeled on a grand piano."

Although the ability to single-handedly mimic the Mormon Tabernacle Choir may not carry much weight in information processing, the underlying pattern-matching technology does. Kurzweil and his coworkers first incorporated this technology into reading-aloud machines for the deaf, then music synthesizers and now voice-recognition equipment.

Kurzweil Artificial Intelligence, Inc. currently offers a Voicesystem add-on for the IBM Personal Computer that recognizes up to 1,000 words. At the meeting, the device performed fairly impressively with Borland International, Inc.'s Reflex and Artificial Intelligence Corp.'s mainframe Intellect software.

See **CONCERTED** page 35

*Bender is* Computerworld's *senior editor, microcomputers.*

# SPSS teams up with Chart

## Pairing combines graphics with statistical functions

**By Peggy Watt**

CHICAGO — A veteran statistics package has acquired a new ally in the microcomputer world, as SPSS, Inc. has paired its analysis program SPSS/PC Plus with Microsoft Corp.'s Chart presentation graphics package.

According to the two vendors, the arrangement goes beyond bundling because SPSS/PC Plus Graphics featuring Microsoft Chart provides a seamless interface between the personal computer version of SPSS and Chart. Data can be transferred between the programs as if between tables in the same application. If figures are changed in an SPSS table, the corresponding graphics are automatically amended.

The combined package, which is due to be available this month from SPSS, runs on the IBM Personal Computer XT or Personal Computer AT and strict compatibles. It requires 384K bytes of random-access memory and a hard disk. Chart requires either an IBM Enhanced Graphics Adapter, IBM Color Graphics Monitor Adapter or Hercules Computer Technology Co. Graphics Card.

SPSS/PC Plus costs $795. The Chart graphics option is an additonal $395, the same cost as Chart. Other options include Advanced Statistics and Tables, priced at $295 each.

SPSS's name is not new to larger systems, with forms of the statistical analysis program available on many mainframe and minicomputer systems. The company

See **SPSS** page 35

## Wordstar local net version introduced

SAN RAFAEL, Calif. — Micropro International Corp. has introduced local-area network versions of its Wordstar word processing package for IBM Personal Computers and compatible systems.

The three networks that are supported are the IBM PC Network, the Novell, Inc. Netware and the 3Com Corp. Ethernet systems.

"MIS managers will be pleased to learn that the network product is identical in structure and operation to the Wordstar product that millions of users have already been trained on," Micropro President H. Glen Haney said.

Retail prices for Wordstar network kits are $160 per workstation for three to nine workstations and $140 each for 10 or more workstations, after the purchase of one package at $350. Corresponding fees for Wordstar Plus are $225 and $195, after the purchase of one package at $495.

# Tandy cuts price on Model 2000

**By Douglas Barney**

FORT WORTH, Texas — In an attempt to increase sales of its technically advanced but slow-selling Model 2000, Tandy Corp. late last month slashed the cost from $1,599 to $999 for a two-disk-drive model. This special price will be available until March 24.

"It hasn't sold. Basically it was the first move into the Microsoft Corp. MS-DOS systems, but it really wasn't a fully compatible system," said Eugene Glazer, an analyst with Dean Witter Reynolds, Inc., a New York-based investment firm.

Glazer added that Tandy moved aggressively into new products, such as the Tandy Model 1200, the Tandy Model 1000 and the Tandy Model 3000, which were all fully IBM compatible. "Those have been the main force of Tandy's personal computer aggressiveness in the marketplace," he said.

The lack of full IBM Personal Computer compatibility was the major drawback to

See **TANDY** page 36

### INSIDE

Olivetti portable system seen as likely candidate for AT&T to sell in U.S./**36**

### NEW THIS WEEK

- Intel offers DOS Pscope debugger
- M/H Group announces W-Links document conversion program

For more on these and other new products, see pp. 75-96.

### INSTANT ANALYSIS

*"Trying to talk about true artificial intelligence techniques is like trying to talk about true beauty techniques."*
— **Raymond Kurzweil, Kurzweil Artificial Intelligence**

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# Oracle unveils productivity tools for SQL/RT on the IBM RT PC

Oracle Corporation has announced six software products for the newly-announced IBM RT PC system. The packages run with IBM's SQL/RT relational DBMS, which was developed by Oracle for IBM. Oracle also announced immediate availability of its full ORACLE product line on the RT PC/AT co-processor.

According to Oracle Director of Product Marketing, Ken Cohen, "The SQL/RT product which IBM is marketing on the RT PC provides a robust relational DBMS. Since Oracle was the source of SQL/RT, we feel well-suited to offer our other products directly. They provide even greater flexibility and decision-support capabilities to RT PC users."

☐**Pro*Fortran**: The Pro*Fortran precompiler allows RT PC programmers to embed SQL database language statements in the middle of their Fortran programs. It is intended for Fortran programs which must access or manipulate SQL/RT database information.

☐**Pro*SQL**: Pro*SQL is a general-purpose call-interface to SQL/RT. Using a simple set of programming calls from a variety of languages supported on the RT PC, the programmer can access SQL/RT.

☐**SQL*IAF**: The SQL*IAF (Interactive Application Facility) package is a complete application generator and run-time system for forms-based applications. It is a complement and extension to the Easy SQL/RT component of IBM's SQL/RT.

The SQL*IAF screen painter lets users design forms using *what-you-see-is-what-you-get* techniques. Multi-table query/update forms can be easily produced for demanding applications. Also, SQL*IAF lets users apply data editing and validation criteria to data entered into forms. Finally, SQL*IAF provides extensive support for non-IBM terminal types, such as DEC's VT-220.

☐**SQL*RPT**: SQL*RPT is a report writer and formatter for use with SQL/RT. Using simple commands, users can create reports of almost unlimited sophistication from their databases.

The database information can also be included in documents formatted with SQL*RPT, allowing text and database processing to be combined in one easy-to-use interface suitable for developers and end-users alike.

☐**SQL*Calc**: SQL*Calc is a Lotus 1-2-3 compatible spreadsheet integrated with the SQL/RT DBMS. Users can place SQL statements into the cells of their spreadsheets, retrieving and updating SQL/RT data automatically. Large SQL/RT databases can be shared among spreadsheet users, with all of the database instantly available to them.

☐**SQL*Link**: SQL*Link provides a micro-mainframe link which allows intelligent transfer of database information between SQL/RT on the RT PC and the ORACLE relational DBMS running on IBM PCs and a variety of mainframes and minis.

SQL*Link lets users exchange information between PCs with ORACLE and the RT PC, with the RT PC serving as a Host.

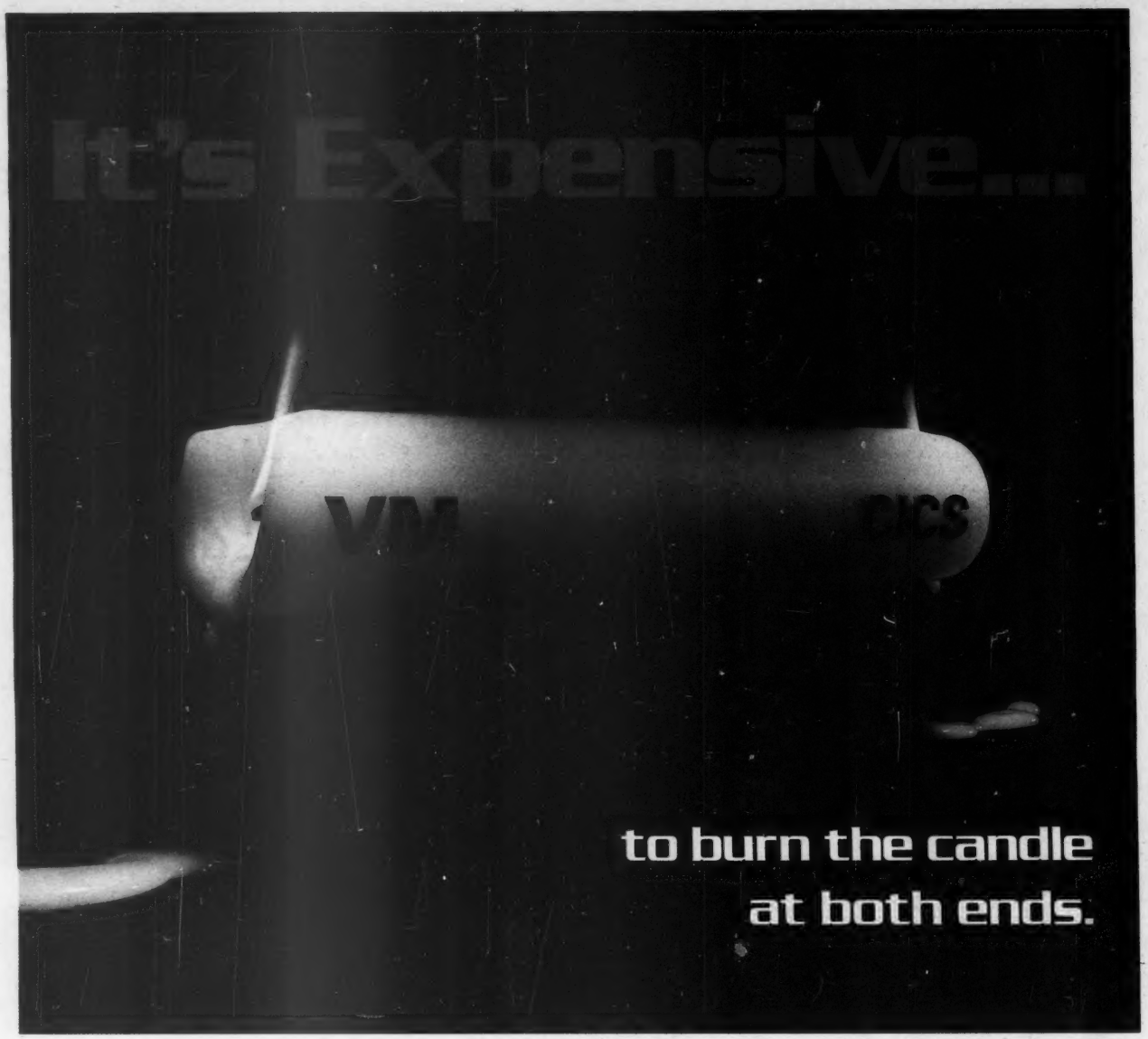
The package also lets users of SQL/RT exchange database information with a mini or mainframe running ORACLE.

☐**PC/DOS Support**: The ORACLE relational DBMS, 4GL and DSS tools are also available to run on the IBM RT PC/AT co-processor option.

Oracle produces and markets the ORACLE relational DBMS, 4GL and DSS software. ORACLE runs on a wide range of computers, including IBM mainframes, DEC, DG, HP, Stratus and most other minicomputers, and a wide variety of micros, including the IBM PC family.

Oracle distributes its products through a worldwide network of 30 direct sales offices, through the Authorized Oracle Dealer network, and through VARs which participate in the Oracle Alliance program. With its direct and OEM marketing efforts, ORACLE is used by 39 of the top 50 multi-national corporations and at thousands of sites overall.

For further information, contact Oracle Corp., Dept. CWST3, 20 Davis Drive, Belmont, CA 94002, 1-800-345-DBMS.




When performance problems are in the wind, outdated monitoring techniques can leave you in the dark. The **EXPLORE*** family of performance monitors from Goal Systems can shed more light on performance problems than older, more limited products.

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Additionally, **EXPLORE/VM's** extended color support immediately provides information on the seriousness of performance problems without the need for time-consuming analysis of numerical data. Critical problems are displayed in **RED,** to make you instantly aware of when your system is burning up valuable resources.

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*EXPLORE/CICS supports CICS 1.5 and 1.6 EXPLORE/VM supports VM releases 2, 3, and 4 as well as all HPO releases including 3.8.

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# The concerted Kurzweil effort

From page 33

More dramatic is the upcoming Kurzweil Voice Writer, which lacks much resemblance to anything now on the market. Among its other claims to fame, the Voice Writer apparently will be the first word processing equipment boasting a massively parallel architecture, with numerous custom signal-processing chips and Motorola, Inc. 68000 CPUs. Its hard-disk storage also will be rather large, on the order of 100M bytes.

Kurzweil plans to market the new flagship product to executives, saying that it will help them create text at up to 60 words per minute — four to six times faster than by existing methods. The overwhelming majority still laboriously write out documents by hand. Or they dictate and then often have problems organizing their work, he said.

Handling vocabularies of more than 5,000 words, the first commercial Voice Writers will be shared by up to eight users, who can access the input device one at a time through high-speed serial lines. The resulting text can be modified with standard word processing software on their workstations. The initial price tag will be under $20,000, and later versions are expected to sell for $5,000 to $6,000.

A prototype Voice Writer provoked skepticism last summer by requiring 2½ minutes to process each word, but Kurzweil said that real-time performance has been demonstrated during the past month. The technical approach, which employs multiple expert systems, is described in this month's *Byte* magazine.

An ideal voice-recognition system would combine large vocabularies, speaker-independence and the ability to recognize continuous speech, Kurzweil remarked, adding that we're probably about five years away from seeing such equipment.

### Discrete speech more natural

The Voice Writer handles discrete speech, which is not as great a limitation as commonly supposed because users quickly pick up the habit, Kurzweil said. He also insisted that discrete speech is more natural than other methods of dealing with computers, like hitting keys. His firm hopes to introduce a continuous speech product later this year.

Solving these kinds of problems goes way beyond generalized pattern-matching techniques, Kurzweil said. "You can build general pattern recognizers; they just don't work. . . . It's the domain-specific technology that's the bulk of the work."

Pattern recognition falls within the huge and hazy boundaries of artificial intelligence technology, and Kurzweil seized the moment to discuss the difficulties in nailing down what AI means. "Other fields don't seem to have this problem," he noted. "Talks on biology don't begin, 'What is biology?' "

"We've never had much problem defining artificial," but intelligence is another matter, he added. And he concluded that no simple summary is possible: "If AI is any one thing, it's not one thing."

# SPSS teams up with Chart

From page 33

entered the microcomputer marketplace with SPSS/PC Plus in July 1984.

"Our users had been asking for graphics," said Mark Achler, SPSS's microcomputer product manager, who chose Chart after testing 26 programs.

SPSS offers "an extension of the Chart market" and a path to some doors the package had not yet reached, according to Trish May, Microsoft Chart product manager.

### 'The mainframe graphics were the best'

One longtime SPSS user said he welcomes the new graphics capabilities. "The mainframe graphics were the best, but I needed something to make presentation graphics on the PC," said Dana Lefler, assistant to the director of community development in the city of Arlington, Texas. He said he has used SPSS on various systems since 1972 and has appreciated the improvements.

The graphics features are arriving just in time for him to use in a new project that requires presentation graphics, he added. "I've been putting the data into SPSS/PC Plus to produce the statistics and reports, but now I'll be able to carry it through to the graphics," he said.

SPSS's Achler claimed that it "would almost take two packages" to compete with the new SPSS/PC Plus Graphics, and separate programs would lack the interface between tables and graphics. "Nobody has data analysis with business graphics."

### New features include 16 colors

Version 2 of Chart, released last December, is paired with SPSS.

New features include 16 colors, taking full advantage of the IBM Enhanced Graphics Adapter, and support for another 20 printers and plotters.

Chart already reads data from Multiplan files and now reads files created by Ashton-Tate's Dbase products, Lotus Development Corp.'s 1-2-3 as well as any IBM Data Interchange Format or ASCII files, Microsoft's May said.

Chart includes eight chart types and 45 preformatted charts and can place up to 16 charts per page.


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CFW

# Olivetti announces three micros, may distribute in U.S.

By Janette Martin
Computerworld News Service

VENICE — Ing. C. Olivetti & Co. last month unveiled three new personal computers, including a portable that may be modified for sales to the U.S. market through Olivetti partner AT&T.

Olivetti, Italy's leading office equipment maker, plans to increase personal computer production by 100,000 units to 500,000 in 1986, company sources said.

The M22 portable, available in June throughout Europe, will cost about $3,000 in Italy and will come with an Intel Corp. 80C88 microprocessor with a 4.77-MHz clock speed. Also included are 256K bytes of random-access memory (RAM), expandable to 1M byte, and a backlit LCD screen reportedly able to display 80 columns by 25 lines. A parallel port and serial port are standard.

The machine's ½-height diskette drive uses 5¼-in. diskettes. A 3½-in., 10M-byte internal fixed disk is optional. The M22 operates on batteries or household current and features a desk organizer, called Personal Windows, that is resident in read-only memory. Also included are one IBM Personal Computer-compatible expansion slot and two Olivetti-compatible expansion slots.

Olivetti Executive Vice-President of Operations Vittorio Levi noted the company's ties to AT&T and said that the giant supplier is interested in tailoring the M22 to the U.S. market.

The high-end M28, expected to be available across Europe by May, will cost about $3,000 in Italy and will come equipped with an Intel 80286 microprocessor operating at 8 MHz.

Olivetti's low-end M19 is a desktop machine aimed at Europe's educational market.

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# Tandy cuts 2000's price

From page 33

the Model 2000, agreed Jay Samstag, a vice-president with Duff & Phelps, Inc., a Chicago investment firm.

Tandy officials said the firm is not slashing the price to reduce inventory nor is it phasing out the Model 2000.

Tandy's strategy may be successful in boosting sales, Glazer said. "It is a good product. I think they could sell quite a few at that price." Aggressively pricing the Model 2000, Tandy hopes to sell the machine to business users and to some sophisticated home users.

The Model 2000, introduced in November 1983, was Tandy's first foray into the MS-DOS world. The Model 2000 offers significant performance advantages over the IBM Personal Computer, but the system suffered both from lack of IBM compatibility and product availability shortages due to insufficient supplies of the Intel Corp. 80186 microprocessor.

After Tandy introduced the highly successful, fully IBM-compatible Model 1000 and Model 1200, it shifted its marketing of the Model 2000 to the power user "looking for IBM Personal Computer AT-like performance at a fraction of the cost." This strategy worked in getting the product into the market for micro-based computer-aided design but failed to achieve broad penetration of the business market.

Many of Tandy's temporary price cuts have been made permanent, but Arutt declined to speculate whether the Model 2000 would return to its original $1,599 price tag or whether the product will be enhanced in the future. The Model 2000 with an internal 10M-byte hard disk has been reduced from $2,499 to $1,899.

Despite the lack of full Personal Computer compatibility, Tandy offers 188 software programs for the Model 2000, including Lotus Development Corp.'s 1-2-3, Ashton-Tate's Dbase II and III and Microrim, Inc.'s R:Base 4000 and 5000.

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# SYSTEMS & PERIPHERALS

**HARD TALK**
James Connolly

## DEC puts its ducks in a row

It looks like a duck (Quack!). It walks like a duck (Quack!). It sounds like a duck (Quack! Quack!). But worry not, because it is not a duck (Moo?).

Digital Equipment Corp. says that its strategy is not a duck, but it sure looks like one. At its Decworld '86 product showcase in Boston two weeks ago, DEC officials kept saying that the company is not going head-to-head with IBM, even if it may seem that way.

Why would someone believe that DEC, contrary to what it says, sees its three primary competitors as I, B and M? Because that is how it looks and sounds.

"We are not stupid; we do not pick a fight with someone seven times our size," says Rose Ann Giordano, DEC's vice-president for large systems marketing, in summarizing the attitude of DEC and DEC founder Kenneth H. Olsen. Giordano and other DEC officials said repeatedly during Decworld week that DEC is targeting only selected IBM markets.

But the evidence seems to prove that DEC sees itself as competing with IBM in all arenas.

Think back to most of DEC's major product announcements of the past year or so, and recall with which products Olsen and his staff repeatedly compared their products. It was with IBM offerings, particularly products at the high end of DEC's product line, the VAX 8650 and the VAX 8800. Time after time, DEC officials have presented performance and price numbers showing how their systems, particularly when in cluster configurations, shape up against IBM's 3090 mainframes.

Of course, DEC is only one of many vendors who plug IBM figures into

See **DEC** page 43

*Connolly is* Computerworld's *senior editor, systems & peripherals.*

# IBM recalls 72M-byte disk

## Customers can trade 4702 disks for two smaller drives

**By Charles Babcock**

NEW YORK — IBM has notified customers that under certain conditions, its 72M-byte hard disk, sold with its 4702 banking processor, can malfunction, leading to a loss of data.

The hard disk, designated the 1095, was the larger of two hard disks offered with the 4702 bank branch automation processor announced in May last year. Banks typically use the 4702 as a replacement for the 4701 in tying together branch office functions, including automatic teller machines, and linking them to the central office.

In mid-January, IBM informed customers by letter that they could return the disk in exchange for two 30M-byte hard disks, both of which may be used with a 4702 processor. The 30M-byte disk, designated the 1085, has no reliabilty problem, IBM spokesmen said.

The alternative to exchanging, according to a bank official who asked not to be identified, is keeping the 72M-byte drive "and taking your chances."

The IBM letter stated that no failures have occurred with the 1095 in the field; the potential for failure was discovered by quality assurance tests at an IBM laboratory, according to spokesmen for two banks that use the drive.

"We consider the possibility of failure quite small," said IBM spokesman Linda K. Nardin in Rye Brook, N.Y. Nevertheless, the company has halted shipments of the 72M-byte drives and is offering credit or exchanges to customers, Nardin said.

Although Barry N. Johnson, assistant vice-president of the First Bank System, Inc. of Minneapolis, said he had been told by bank technicians that the drive could "overheat in a confined area, leading to a loss of data," IBM spokesmen said no single problem had been isolated in the drive.

"We have not identified the specific environmental conditions that affect the drive's reliability," Nardin said.

See **IBM** page 42

# Convergent's Mightyframe/JWS, Aida's CAE workstation debut

**By Rosemary Hamilton**

Two more engineering workstations, both designed for high-end applications, hit the market late last month, one from niche player Aida Corp. and the other from Convergent Technologies, Inc.

Aida introduced a $140,000 workstation designed for complex applications in the computer-aided engineering (CAE) market. The system, based on the Apollo Computer, Inc. line of workstations — including the Apollo products introduced last month — is dubbed a "mainframe alternative."

Convergent Technologies announced the Mightyframe/JWS, a joint effort with Jupiter Systems of Alameda, Calif. The $23,800 single-user system is based on Convergent's 32-bit Mightyframe computer, a Digital Equipment Corp. Microvax II competitor that was introduced in late 1985. Jupiter Systems supplied a graphics processor board and software for the workstation that is said to provide high-resolution three-dimensional and two-dimensional graphics capabilities.

Both companies will sell the Mightyframe/JWS to OEMs. No customer names have been released, according to Rich Wesson, vice-president and general manager of Convergent's network systems division.

Aida's workstation, with the use of an Aida-designed coprocessor board and artificial intelligence-based software tools in an Apollo box, can handle data entry, design, test and analysis of multichip and multiboard projects. Those capabilities give it a performance advantage over existing CAE workstations, the company said. Many CAE engineers use current workstations for design entry and then port their data to larger systems for the compute-intensive analysis and test functions, said Fred Buelow, Aida president. However, the entire process can be done on the Aida Design System, he said.

The Aida system is targeted at approximately 20% of the engineering community. "We're looking at systems designers, not component designers," Buelow explained. Aida does not plan to compete direct-

See **CONVERGENT** page 42

## INSIDE

A laser printer is helping General Electric run an in-house publishing system/**40**

Scientific Computer Systems introduces a Cray-compatible near supercomputer/**41**

Data General releases four Dasher terminals/**42**

## NEW THIS WEEK

- Adage introduces 6480 graphics terminal, 3500 graphics system and enhances its Cadstation 2/50

■ For more on this and other new products, see pp. 75-96.

## INSTANT ANALYSIS

*"I think it is a very appropriate kind of gambie for HP to have taken."*

**— Dean Morton, chief operating officer, Hewlett-Packard Co., on the company's move to reduced instruction set computing**

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# Laser printing system makes light work for GE copy center

## Xerox 9700 cuts production costs

By Donna Raimondi

CLEVELAND — A leading manufacturer of light bulbs and lighting fixtures found that an in-house laser electronic printing system speeded printing and cost less to operate than traditional line printers.

The copy center at General Electric Co.'s Lighting Business Group in Cleveland generates more than 30 million copies per year. It provides services ranging from creative art to multicolor commercial photography, printing and distribution on a variety of equipment, including two Xerox Corp. 9900 electronic copiers, an Eastman Kodak Co. Kodak 250 copier and a Xerox 6500 color copier.

In September 1983, GE added a Xerox 8700 laser printer, quickly reached capacity with it and replaced it in June 1984 with a Xerox 9700 laser printer. "The line printers for computer-generated reports were limited in lines per minute, and we felt that for less money we could get a high-tech 8½- by 11-in. computer-generated report that was easier to read," said Tony Mazzolini, manager of graphic communications.

A key benefit of the new system is its speed in handling data processing print runs, Mazzolini said. All computer-generated documents were previously printed on four department line printers, each of which could print about 1,600 line/min. By comparison, the Xerox 9700 can print up to 18,000 line/min.

The 9700 system generates forms, computer reports, manuals and other documents for in-house customers. It consists of the printer, a keyboard, monitor, a tape storage device and its own programming language, the Xerox Form Description Language. A Xerox spokesman said the 9700 costs approximately $400,000 for a typical configuration.

The projects being run on the 9700 printer typically took several days when conventional printing and production methods were employed, Mazzolini said. The 9700 is off-line to a Honeywell, Inc. DPS 8 Model 70 mainframe running Honeywell's GCOS operating system, an IBM 3083 running IBM DOS, an IBM 3090 Model 200 and two Digital Equipment Corp. VAX 11/750 and eight VAX 11/780 superminicomputers. Another 9700 probably will be dedicated to the IBM 3090 within the next few months, he added.

Before installing its printers the group used conventional presses — or an outside printing house, in certain cases — to print the forms and contracts for its manufacturing plants, sales offices and distribution centers.

Manual production of forms entailed typesetting, proofreading, paste-up, photography, stripping, platemaking and filing of negatives. Because the demand for forms was growing along with the business, Mazzolini knew those steps would have to be automated.

"We saw that the 9700's capability for creating lines, shaded areas, logos, signatures and so on — in both horizontal and vertical page orientations — would enable us to bypass most manual forms design and production tasks," Mazzolini said. The system enabled him to hold off on adding skilled graphics production personnel and printer operators. High-volume forms still go to outside printers, but when a few copies are needed, they are generated on the in-house system.

### Not for entry level

Entry-level people cannot run the system, Mazzolini said. "You need certain creative and artistic skills and certain basic programming skills," he added.

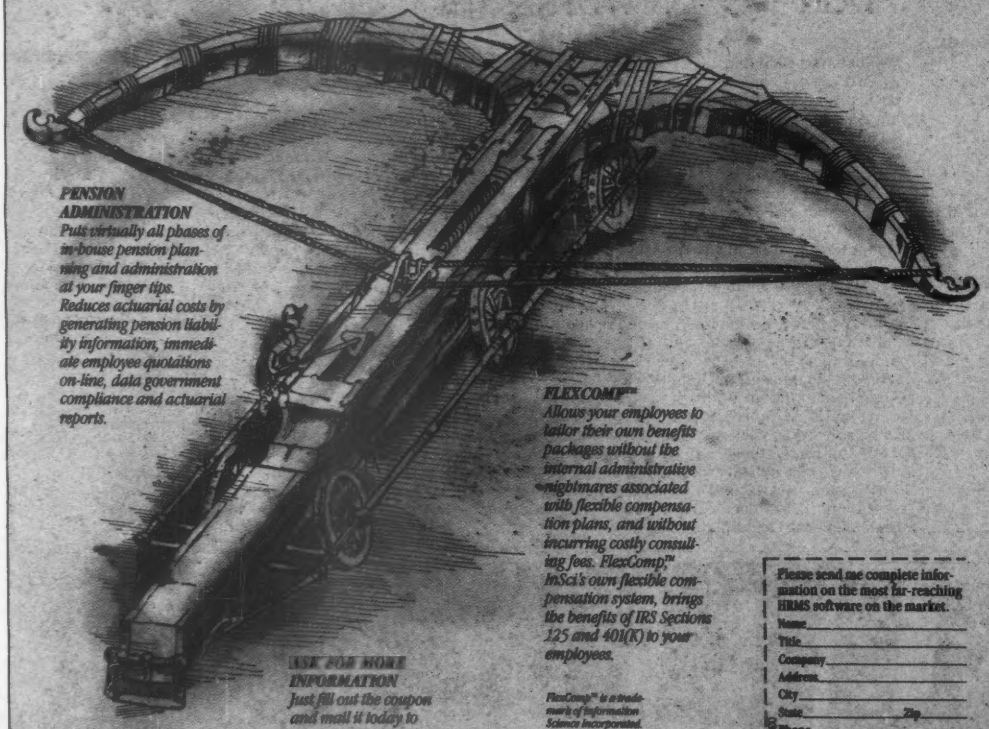
The 9700 produces about 1.5 million to 2 million pages a month on standard cut-

See LASER page 41


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# Scientific Computer Systems announces 64-bit minisuper

## SCS-40 features Cray compatibility

By Donna Raimondi

A 64-bit minisupercomputer that is compatible with Cray Research, Inc. supercomputers is expected to be announced today by Scientific Computer Systems Corp. of Portland, Ore.

The system is likely to find a home among current time-sharing users of Cray machines and among Digital Equipment Corp. VAX users who need high-performance vector processing, said Jeffry Canin, senior technical analyst at Hambrecht & Quist, Inc., a San Francisco-based investment banking firm.

Canin placed the new system in the "near-supercomputer" range, which he defined as being composed of 64-bit machines with good vector performance that fill the gap between superminicomputers and supercomputers.

The SCS-40's Cray compatibility is the feature that will set the system apart from numerous other minisupercomputers from companies like Convex Computer Corp., Alliant Computer Systems Corp. and Culler Scientific Systems Corp., Canin said.

### Performance 25% of X-MP/1's

The SCS-40, which uses the Cray X-MP instruction set, is said to deliver 25% the performance of the Cray X-MP/1 supercomputer.

An entry-level system — targeted for general-purpose scientific and engineering markets — costs $595,000. It offers compatible Fortran compilers and operating system environments to fit the Digital Equipment Corp. VAX VMS environment and the Cray Timesharing Systems (CTSS) environment.

Cray compatibility is achieved through emulation of the Cray XM-P instruction set, use of the CTSS operating system and use of vectorizing Fortran 77 compilers that adhere to ANSI 77 standards and accept VAX Fortran source code.

### VAX VMS relationship possible

The VAX VMS relationship is achieved through software that allows VAX users to run applications on the SCS-40 without exiting the VMS environment.

According to Robert Schuhmann, firm chairman and chief executive officer, more than 200 engineering and scientific applications packages that have been vectorized and optimized for the Cray since 1976 will run directly on the SCS-40.

The system can be used interactively or in batch mode. I/O station interfaces are available for the DEC VAX series machines.

The SCS-40's bus structure accommodates both scalar and vector data flows in a concurrent fashion, and parallel pipelined functional units can be shared by the vector and scalar sections.

## Laser printer cuts GE costs

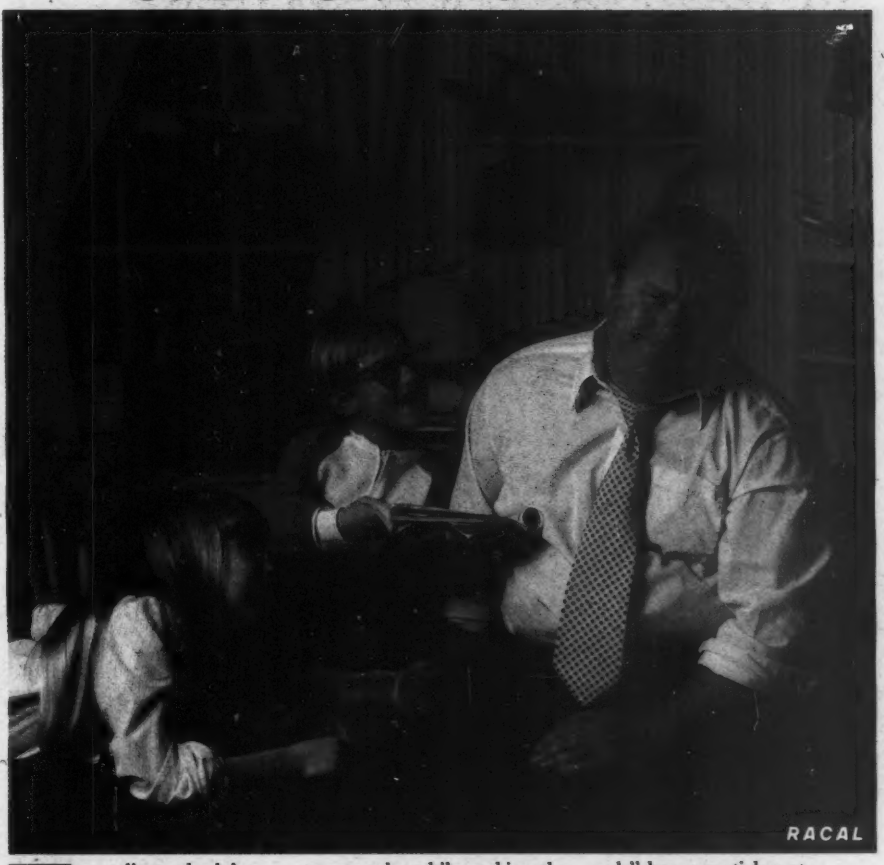
From page 40

sheet paper. The printer provides a means for tailoring forms to customer specifications, Mazzolini said. A customer — typically a manager, engineer or secretary — submits an existing form or a drawing of a new form to the graphics communications department.

A printer operator uses Form Description Language — a set of about 20 software instructions — to design the form's headings, margins, line spacing, shaded areas, columns, signatures and logos when the printer is not doing production work.

The printer eliminates the bursting and decollating from the data processing department because it uses cut-sheet paper rather than continuous forms, and it prints each page of a report in sequence.

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# IBM recalls 72M-byte disk

From page 39

Several banks have choosen to send the 1095s back. A Philadelphia institution, which has a pilot project to automate 12 branches, is returning all 12 of the 72M-byte hard disks in exchange for pairs of 30M-byte disks.

A spokesman who asked to remain anonymous said that, although the Philadelphia bank wanted the 1095's storage capacity for future expansion of its branch automation program, it did not yet need it.

First Bank's Johnson said his bank was sending back four 1095s.

Broadway & Seymour, a software house in Charlotte, N.C., whose Maxim banking system is designed to run on the 4702, said it is still early in the life cycle of the 4702, and most of its customers were purchasing it with the smaller hard disk.

IBM representatives declined to comment on how many 1095s were being returned.

The 72M-byte drive is manufactured for IBM by an outside supplier. IBM said the name of the supplier was proprietary information and refused to disclose it.

The 30M-byte drive retails for $1,995; the 72M-byte drive retails for $4,000, IBM representatives said.

First Bank System plans to install 100 of the 4702 processors eventually and to equip them with the larger drive. "If they get the problem cleared up, we'll probably be a customer for it," Johnson said.

# DG rolls out Dasher VDTs to replace earlier terminals

WESTBORO, Mass. — Data General Corp. recently released two Dasher 400 series and two Dasher 200 series terminals that will replace earlier terminals.

The new models incorporate screen saver and soft setup menu features. The screen saver is said to extend the life of the display by preventing image burn-in. It clears the display after a specified period of inactivity.

The soft setup menu allows variables such as terminal transmission speed, parity and mode of operation to be set by keyboard responses to menu prompts.

The $1,495 D461 is a graphics display terminal, and the $1,195 D411 is an alphanumeric display terminal. Both target business automation, word processing and interactive data entry applications.

The terminals replace the D460 and D410 models, respectively, and are approximately 30% less expensive.

### Alphanumeric display terminals

The D215 and D214 are alphanumeric display terminals designed for interactive data applications.

The D215 costs $895, 25% less expensive than its predecessor, the D211. The D214 is $795, 31% less expensive than the D210 that it replaces.

The D215 model has multilingual capability that allows the display of one or more languages, support for 11 different versions of the DG Model 6348 keyboard and support for local printing and pass-through operations in which a printer serves many terminals.

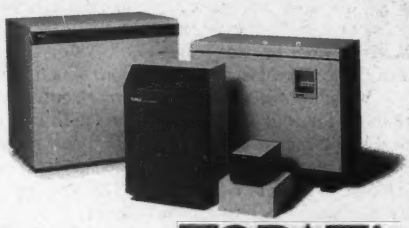
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# Convergent, Aida units debut

From page 39

ly with Daisy Systems, Inc., Mentor Graphics, Inc. or other vendors that sell into the general CAE market, he said. Instead, the company is targeting engineers currently using workstations and large systems, who would prefer to do their jobs on one system.

The Mightyframe/JWS, however, is designed for the more mainstream workstation applications — computer-aided design and computer-aided manufacturing — which positions it directly against the offerings from major workstation vendors Apollo, DEC and Sun Microsystems, Inc. According to Wesson, the system, which operates under CTIX, Convergent's version of AT&T Unix System V, costs $33,000 in a two-user configuration. Shipments are expected to begin in late May.

The Aida Design System, which is scheduled for shipment in April, will include the Apollo workstation and will run under Apollo's version of the Unix operating system, Domain/IX. It comes with the Aida design entry, test and analysis tools, as well as its Co-Simulator Accelerator, a coprocessor board used to speed up the process of simulation, which tests and analyzes a design for accuracy.

A tool called the Logic Design Rules Checker is an expert system that can be programmed with specific rules at an engineering project's outset. Once the rules are established, errors will be spotted early on in the design phase, thus elimating the time-consuming task of finding errors once a design has been completed, the company said. A typical configuration sells for $140,000 and supports one user. Current Apollo users can purchase the Aida software and coprocessor for $85,000.

# DEC's ducks all in a row

From page 39

their price/performance charts. But DEC, with almost $7 billion in revenue, is the biggest of those vendors and is probably the IBM competitor covering the broadest spectrum in terms of markets and products.

At Decworld, DEC boasted of its Solutions Center, a hotel parking garage converted into partitioned office and factory environments where DEC sales representatives met with customers to discuss products. This was the area where DEC officials were targeting vertical markets with both hardware and software — where, presumably, DEC was focusing its sales efforts on selected IBM strongholds.

Here are the markets DEC identified in its Solution Center: legal, newspaper, telecommunications, data services, financial, business and office, information systems, government, process manufacturing, discrete manufacturing, science and research, medical and education. If those are the markets where DEC is targeting IBM, what is left? Little or nothing.

It must be remembered that there is nothing wrong with going after the competition on all fronts or on carefully selected fronts. But it seems hypocritical that DEC plays the part of the little mini maker serving the niche market with one hand while using the other hand to hold up a sign saying that its minis can be mainframes, too, and that its specialized systems are general purpose.

It is unfair to the customer to leave so many escape hatches, so many opportunities to say that the press and the customer misinterpret the company's intentions and offerings. If DEC wants to be all things to all people then let the company make the commitment and say so up front and do it with whatever pride is appropriate.

> ***The evidence seems to prove that DEC sees itself as competing with IBM in all arenas.***

# Prime unveils NSA-certified supermini

**By James Connolly**

NATICK, Mass. — Prime Computer, Inc. recently introduced the company's T3350 superminicomputer, which has been certified under the U.S. National Security Agency (NSA) Tempest program for use in an office environment.

The system is now available to U.S. government agencies and contractors that deal with classified information.

An international version based on 50Hz power is expected to be certified this month, according to Prime officials.

**First Tempest certification**

According to a Prime spokesman, the T3350 is one of the first superminicomputers to receive NSA's Tempest certification. It is said to be one of the few Tempest systems small enough and quiet enough for an office environment.

The T3350 includes two cabinets, one for the central processor and I/O controllers and another for disk and tape storage devices, the vendor said.

A Prime spokesman said the T3350 has a main memory capacity of 8M bytes, processes up to 0.85 million instructions per second and features 16K bytes of cache memory.

It supports up to 32 asynchronous lines, a 315M-byte disk drive and a streaming tape drive.

The product runs Primos 19.4 and the same software packages that run on Prime's 50 series systems.


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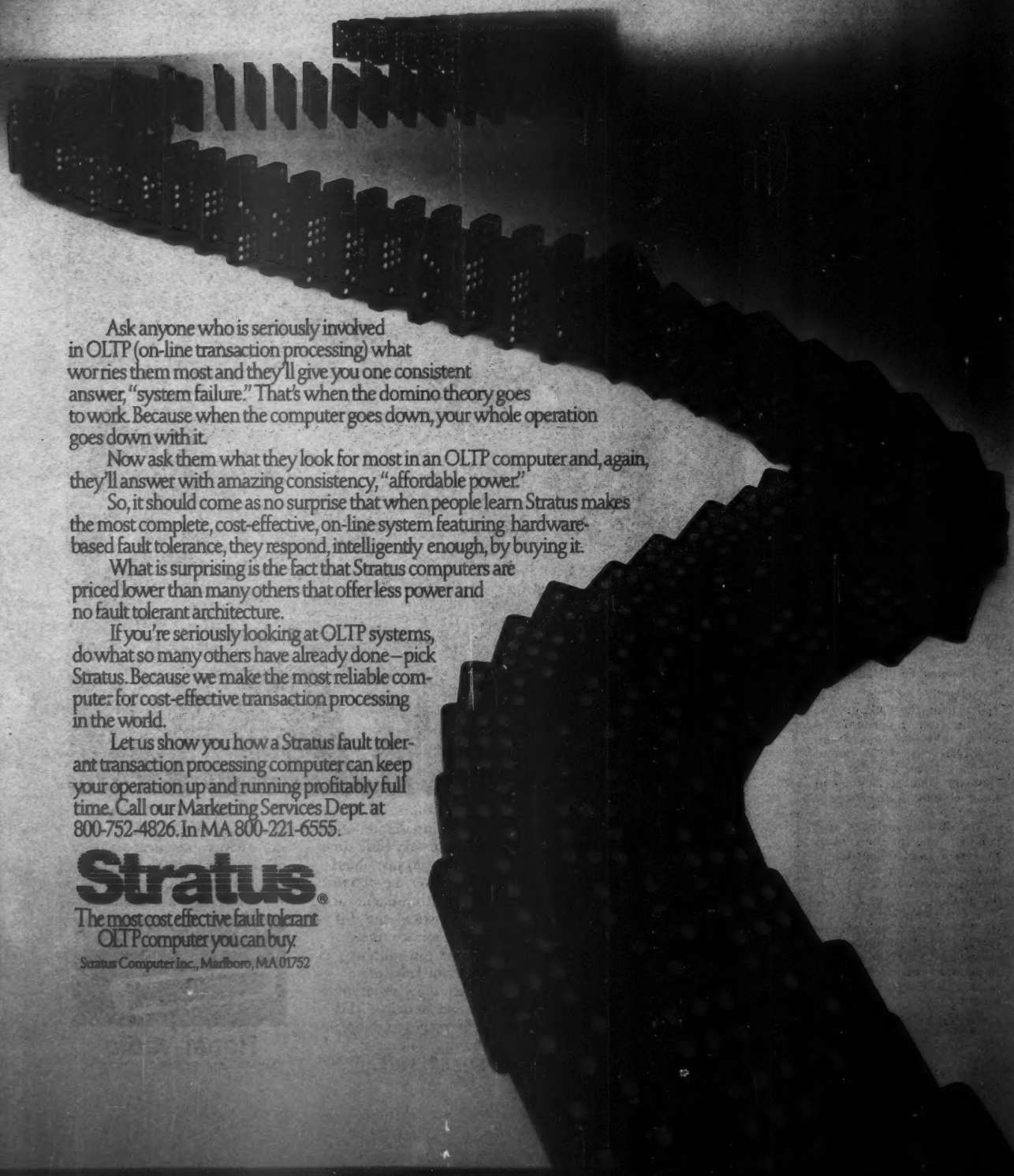
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# Product Spotlight

*Edited by Barbara Wierzbicki*

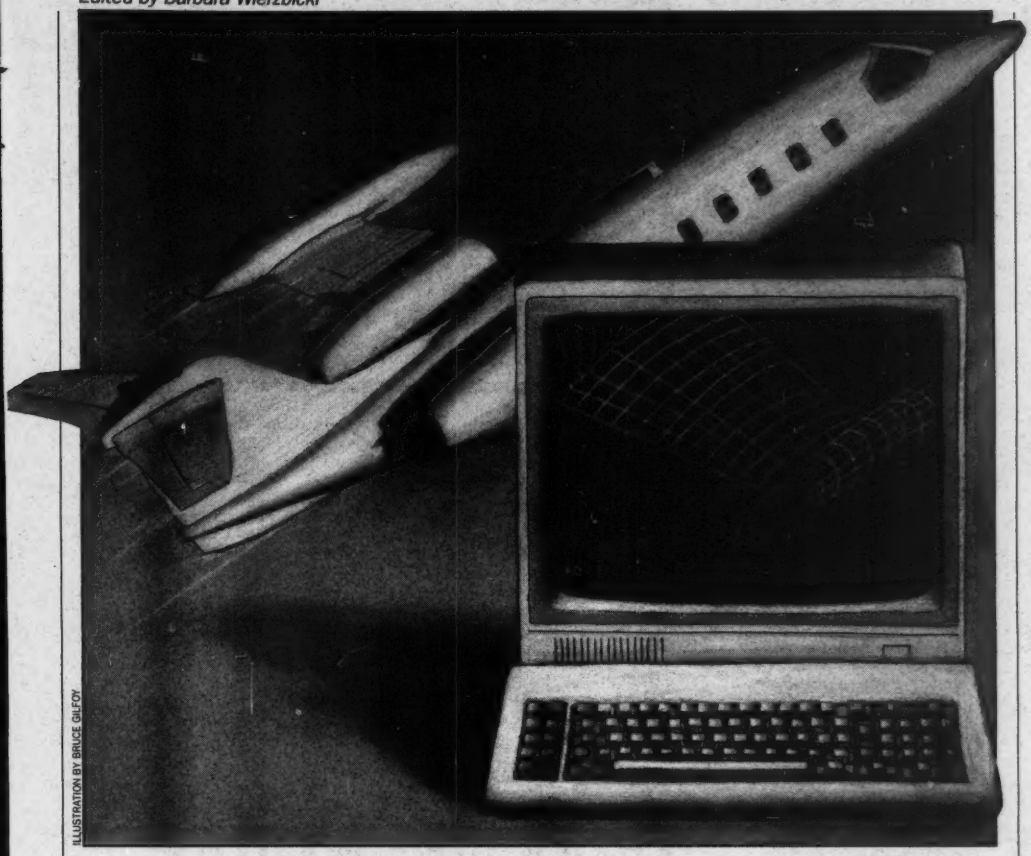


ILLUSTRATION BY BRUCE GILFOY

## INSIDE

***The state of the workstation market: Interview with Apollo Computer's Edward Zander/48***

***Comprehensive 32-bit technical/ engineering workstation chart/52-54***

# 32-bit technical workstations

## *High-powered micros for exacting applications*

**By DAVE WILSON**

Propelled by substantial cost advantages and boosted performance levels, corporations are adopting 32-bit technical workstations — with or without the cooperation of the data processing department.

Workstations capable of handling several hundred million bytes of data are not uncommon. Therefore, the potential for massive dollar loss and business damage is very high should workstations not receive the attention they deserve from DP departments.

Technical workstations — the next logical step on the evolutionary path for personal computers — will grow into a multibillion dollar a year industry by 1990. The advance toward more powerful hardware, bigger memory units and more sophisticated software is fueled by clear corporate benefits — cost savings and greater profits.

The workstation market, one of the hottest in the industry, is currently a battlefield of frenzied activity. In January, Sun Microsystems, Inc. introduced the 3/50M system and also announced joint marketing agreements with two low-end supercomputer makers, thus furthering the workstation vendor's attempts to promote its Network File System as an industry standard.

On the heels of the Sun Microsystems announcement, Digital Equipment Corp. unveiled the Vaxstation II/Graphics Processor Extended, a Unix-based color version of its Vaxstation II engineering system. IBM had its "coming out"-party Jan. 21 when it introduced the IBM RT Personal Computer, a 32-bit reduced instruction set machine.

Not to be outdone, Apollo Computer, Inc., the once dominant engineering workstation vendor, revamped its entire line of systems last month. And several weeks ago, Convergent Technologies, Inc., combining forces with Jupiter Systems Co., unveiled their Mightyframe/JWS workstation offering.

This ongoing vendor slugfest results in good news for the budget-minded manager: the ready availability of inexpensive, high-performance workstations.

The term "workstation" defies definition. Depending upon the application, the appropriate equipment at a workstation runs the gamut from dumb ASCII terminals to complex semicustom,

***Cost/savings is the overriding rationale behind transplanting applications formerly done exclusively on mainframes to 32-bit workstations.***

*Wilson is manager of product research at Future Computing, Inc., a Dallas, Texas, market research firm.*

# *Powerful micros for exacting tasks*

**Continued from previous page**
high-performance systems.

A 32-bit technical/engineering workstation can be characterized as follows:

- A highly interactive system specifically equipped for the technical professional.
- Stand-alone processing power but typically used in a network.
- CPU is a dedicated 32-bit microprocessor.
- Significant on-board random-access memory, disk and I/O capability.
- Graphics capability with display technology resolution appropriate for a specific application.
- Cost is currently less than $40,000 and decreasing.
- Several times the performance of a standard personal computer.

While this broad definition potentially covers a variety of products, current hardware technology limits the number of workstation offerings that legitimately meet the above guidelines.

User applications also vary greatly, of course. While the workstation of the future will accommodate virtually any computer application, current technology limits its general use by enforcing practical bounds on system performance and data storage capacity.

Applications that are either heavily compute-bound (supercomputer-performed simulations, for example) or heavily data-bound (large on-line data bases) are not candidates for workstations any time soon. Many other applications currently being performed on mainframes, however, such as computer-aided design and manufacturing, are readily moving to the current generation of high-performance workstations.

Cost/savings is the overriding rationale behind transplanting applications formerly done exclusively on mainframes to workstation environments. Executing CAD/CAM applications for integrated-circuit design and printed-circuit board layout on a technical/engineering workstation, for example, results in a substantial cost saving. By incorporating the complex and sophisticated rules of circuit layout and design into the CAD/CAM software, the technical workstation greatly increases end-user productivity.

In many cases, the workstation allows people who otherwise could not design an integrated circuit to do so. Given the high salary levels of the engineers using the systems and the great competitive advantages possible with rapid chip design, the cost of a workstation in the CAD/CAM environment is easily justified.

The technical/engineering workstation also significantly improves user productivity in markets such as technical publishing, graphics and software engineering. As with CAD/CAM, the performance increases are so great and the pool of available humans that can perform the task so small, the payoffs for workstation investment are almost immediate.

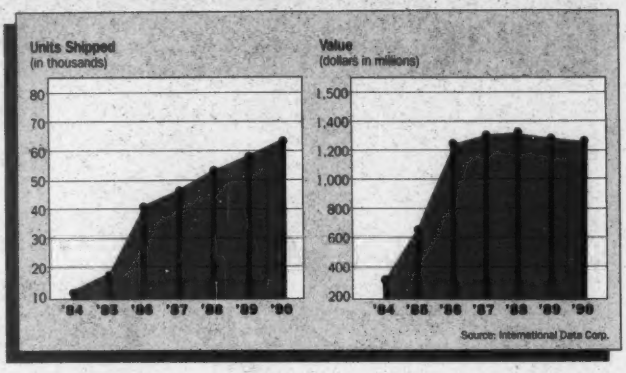
Future Computing, Inc. divides technical workstations into two major categories — general purpose and special purpose. General-purpose workstations, such as the newly introduced IBM RT PC, are those products based on other, generally available computer systems.

Internally, the system is a high-performance 32-bit processor. Externally, the system is an IBM Personal Computer AT bus-compatible computer to which a wide variety of I/O devices may be attached. Thus, although resembling other IBM Personal Computer family members with its open hardware and software architecture, its base engine very definitely qualifies the RT PC as a high-performance, general-purpose workstation.

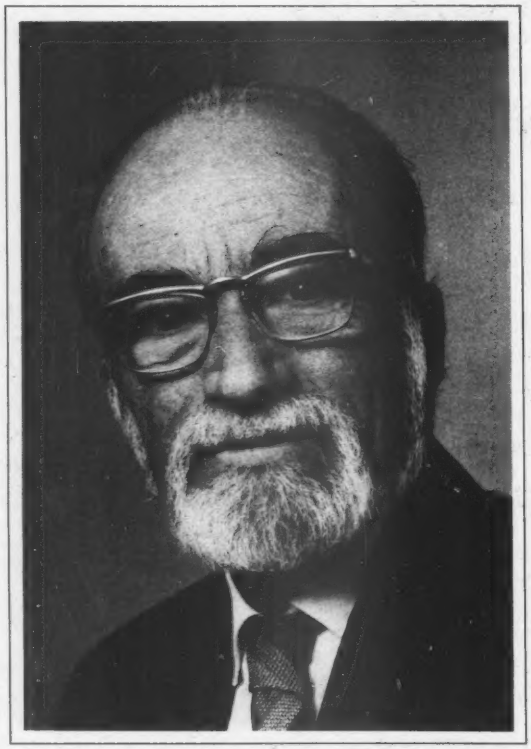
Apple Computer, Inc. on the other hand, uses neither a standard operating system nor an open architecture in its Motorola, Inc. 68000-based Macintosh and Macintosh Plus machines. Their extremely low price

MITCHELL J. HAYES

**TECHNICAL WORKSTATION MARKET 1984-1990**







The Dutch Prof. dr. I. S. Herschberg gained international repute when he 'supervised' the break-in by some of his students into a number of large government and industrial mainframes.

# 'THINK LIKE A THIEF'

Computer security is one of the main subjects to be discussed during The Annual Parnassus Management Conference in Richmond, Virginia. The 'Nestor of European Hackers', Prof. dr. I. S. Herschberg from The Netherlands, will confront Operations managers with the various and manifold security hazards that endanger large computer systems. He will explain why it is inevitable to think like a thief sometimes.

Like security, the problems which beset computer operations people are indeed international – they go beyond boundaries of geography and language. Which is why Parnassus, Inc. is bringing together some 200 operations specialists from the United States and Western Europe, from March 31 tot April 2, 1986 at the Holiday Inn in Richmond, Virginia.

Titled '**Exchanging Practical Ideas In Computer Operations**' this conference will give you a chance to meet all those computer operations managers you've been wanting to talk to for so long. About operations problems that plague us all, about putting good ideas into practice, about the way everyone jumps on you when you miss your deadline by five minutes!

Among the speakers are Chester Delaney and Mrs. Rouja Brzozowsky (Chase Manhattan), Raymond Fernandez (Citicorp), J. Des Lee (Brooke Bond Oxo, U.K.), Tony Caroll (Imperial Tobacco, U.K.) Bernard V. McGinley (Pittsburgh National Bank), Gary W. Schemmel (Federal Reserve Bank of Richmond), Charles W. Via (Philip Morris) and the Dutchmen Wout van Breugel (Heineken Breweries) and Berend Vis (Rabobank).

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tags ($1,999 to $2,599), however, demand that these machines be mentioned as solid low-end graphics workstation performers.

Special-purpose workstations exist in a variety of vertical market areas. Key to such dedicated machines is the concept of a limited market — the workstation's hardware configuration appeals to a special-interest group. In a number of examples in the CAD/CAM area, especially in electrical engineering simulation, special-purpose workstations, such as those offered by Metheus and Cadmus Computer Systems, Inc., have been developed for very specific applications.

However, there is a growing trend in which vertical market products are available on general-purpose machines as the gap between the two workstation types narrows.

Graphics boards, once regarded as special-purpose products, are now often available with high resolution for general-purpose machines. Cards with 600- by 400-dot resolution, like those available from IBM, are commonly available, whereas a few years ago it would have taken a custom workstation to obtain those resolutions. As the technology improves — and becomes more affordable — the distinctions between special-purpose and general-purpose workstations blur.

For the time being, though, tradeoffs exist in cost as well as performance and flexibility. General-purpose workstations predictably cost less because of their much higher sales volumes. They also feature greater flexibility to adapt to applications changes caused by the wider selection of available equipment. Special-purpose workstations, on the other hand, enjoy a distinct performance advantage by offering sophisticated hardware enhancements for specific applications.

Applications needs dictate the type of workstation required. In instances where an application requires such high performance levels that it cannot be achieved without custom hardware, a special-purpose workstation may be the only answer. Most applications, however, can be performed on standard hardware.

In situations where a company evaluating a new application already uses a number of workstations, a significant factor may be the need to remain upwardly compatible with those existing products. It is also important to note that configuring an IBM RT PC or DEC Microvax, for example, with add-on boards elevates the system to performance levels competitive with those offered by special-purpose workstations while retaining the lower cost of general-purpose machines.

Accurate workstation performance evaluation presents a formidable challenge. Ratings such as million instructions per second, bus width, Whetstone timings (floating-point execution speeds) and disk access all play a part in the performance evaluation, but none alone is sufficient to determine workstation performance.

For example, the Motorola 68000 microprocessor, according to a Future Computing report, is far and away the most common microprocessor used in supermicro and workstation systems, based on the number of products that use the 68000. The Apple Macintosh, at the low end ($1,999), uses the 68000; Sun Microsystems and Apollo workstations, at the high end ($7,900 to $19,400), incorporate the Motorola 68020.

Most performance specification tests for the microprocessor give equal performance ratings to the three systems. This, however, clearly does not accurately represent overall system performance.

Running a set of benchmarks on the systems themselves, rather than using microprocessor ratings, is a much better, but still flawed, approach. Unless extreme caution is taken, the timing information provided by these benchmarks yields meaningless analysis.

The only accurate performance measurement assesses how the workstation performs on its intended software task. Even here, timing values are only weak measures of the system. The key concern should be whether or not the workstation performs its intended function at a sufficiently fast execution speed so the user does not become frustrated.

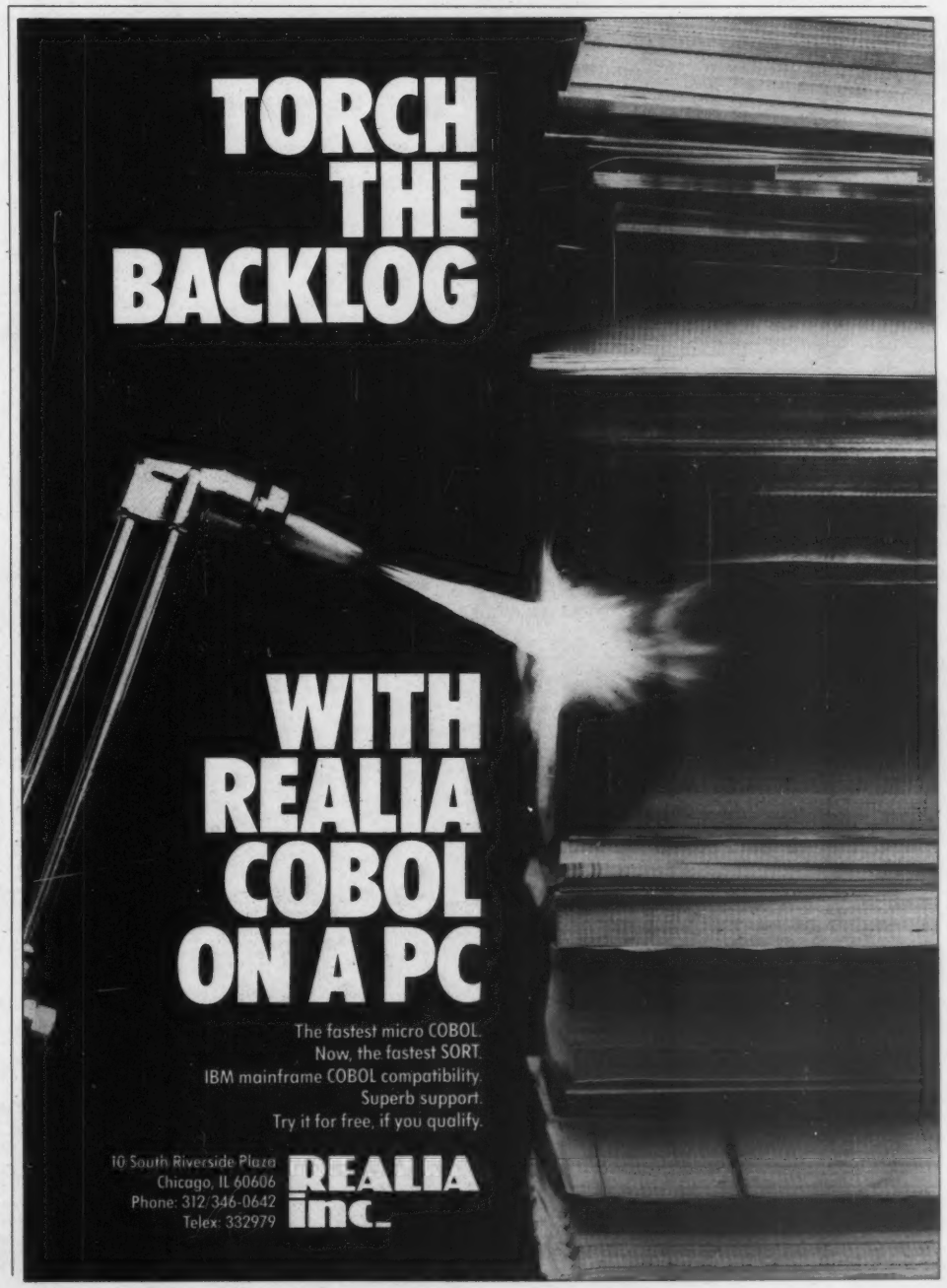
The perceived speed of the machine, from the user's perspective, is a far more significant and accurate indicator than any benchmark performance of the system. This measurement can only be taken with the intended application running on the fully configured system, after system tuning has been performed.

It is in this environment that the Apple Macintosh can be compared with the Sun Microsystems and Apollo workstations. Although the Macintosh is much slower on most applications, the cost is also much lower; if the speed of the Macintosh is sufficient for the application, then benchmark performance is relatively meaningless. If a workstation is too slow, then benchmarks only determine which machine is worst in a situation where none is acceptable.

In hardware, the IBM Personal Computer AT bus structure has become a de facto standard that many manufacturers — most notably Apollo — are adopting.

In software, the progress of Unix toward becoming the standard operating system for technical workstations appears unstoppable. Industry momentum toward Unix is so strong — based both on number of Unix

Continued on page 49



# *Apollo effort keys on technology*

*Edward Zander is vice-president of marketing at Apollo Computer, Inc. in Chelmsford, Mass., where he has worked since 1981. He was recently interviewed at company headquarters by* Computerworld *senior writer Rosemary Hamilton.*

**There has been quite a battle going on in the 32-bit workstation arena. What are the ramifications for Apollo?**

The activity has centered around IBM and Digital Equipment Corp., and that is mainly good for us. DEC and IBM have told the world that distributed computing and technical workstations are the way to address engineers' problems. The challenge for Apollo is to stay ahead in terms of technology. When people look at our products, they have to have a reason to justify purchasing Apollo instead of the competition.



Apollo's Zander

**What is Apollo's strategy in selling against DEC and IBM?**

Obviously we can't compete in terms of pricing or market shares. The only way we'll win is by manufacturing products that are technologically superior such as the Series 3000 Personal Workstations, the DN570 and DN580 that we announced on Feb. 19. We've never felt better in terms of the competition.

**How will these additional players and their products affect users?**

In the long run, it'll benefit them. But in the short term, I wouldn't want to be a user. You've got lots of products flying at you. It's a difficult and confusing situation.

**How do you define a 32-bit workstation?**

I believe a workstation has to be based on integrating high-resolution graphics with high-performance computing and good floating-point performance in a distributed environment. There are vendors who want a piece of the market and only approximate what a workstation can do.

That's where the definition of a workstation gets confusing. The IBM RT Personal Computer is a good example. I have to take issue with its being looked at as the benchmark for workstations — it's a fast personal computer.

**What are the main performance issues from a user's perspective?**

There's always a thirst for more — more power, more graphics capabilities. But now, it is approached from a corporate point of view. Fitting in with a heterogeneous environment is the issue now. The second area is standards — Unix, General Motors Corp.'s Manufacturing Automation Protocol, IBM's Systems Network Architecture and Ethernet. Vendors have to make sure they incorporate these standards in their products.

**But hasn't Apollo been criticized for failing to adopt these very standards? Isn't it true that the company has lost market share, largely due to shipping systems with a nonstandard, proprietary operating system?**

Had we had Unix back in 1983, I really don't know if we would have grown, say, five times more than we did. What I want to point out is that we grew almost 40% last year. Maybe we could have taken some business away from our competitors and grown at 60% if we had had Unix earlier.

**You grew at almost 40%, but you also lost market share.**

Not having Unix earlier did hurt us in that some of our OEM customers went to Sun. I suspect our market share will drop by a few more points because we can't hang on to a 50% share forever. When we started, we had 100%, but now there are many more players in the market.

**Sun Microsystems, Inc. gained a distinct advantage by coming out with a Unix-based system before Apollo did. Beyond, that, there is growing industry support for its Network File System (NFS), designed so heterogeneous systems can transfer files. How do you intend to combat these moves?**

You have to look at the market from the different approaches. DEC is trying to protect its VAX-installed base. Sun goes for the low-cost, commodity-type Unix product. As far as NFS is concerned, we're watching what both AT&T and Sun are doing with file transfer systems. Aside from DEC, Sun has a lot of small companies signed on for NFS. But if NFS becomes a de facto standard — I don't care if it comes from Sun — and our customers want it, we'll give them that.

**When do you see this hotly contested market calming down?**

I thought that very large-scale integration microprocessors and high-resolution graphics were going to play that role when they were introduced in 1981 and 1982. Now it's higher and higher performance, more and more million instructions per second. But I think the price/performance game will be fought out this year. And things should settle down. But who knows, by 1987, there may be a whole new way of computing and a rash of new announcements. ■


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Continued from page 47

installations and the number of products offering this operating system — that a Unix-based processor is almost mandatory.

There are approximately 40 existing versions of Unix, the most popular of which are AT&T's System V and the University of California at Berkeley's 4.2. There are also a number of Unix-based in-house operating systems, such as AIX from IBM, an excellent proprietary Unix implementation. However, prospective workstation buyers beware: The quality of the version and the implementation of Unix are very much manufacturer dependent.

The risk of adopting nonstandard hardware and software is obsolescence. However, if the application software that is needed runs only on proprietary operating systems, then that risk may well have to be taken.

If the workstation concept is successful, more workstations will often be required, and/or the application will become increasingly sophisticated. For this reason, a single stand-alone workstation is generally not recommended. If a workstation family exists, it becomes easier to migrate the application up to higher performance systems or to replicate the application on another system. Again, the issue of compatibility with previous workstations within a company plays an important role. The new generation of high-performance workstations typically provides either compatibility with its previous family members (68020 workstations are usually upwardly compatible with 68000 workstations from the same manufacturer) or introduce a new product intended to be compatible with future offerings, such as the IBM RT PC. The necessity for a workstation family is tied to the application, but the existence of a family should always be kept in mind for the future.

In general, workstations should be single-user, multitasking computer systems. Workstations are most often interconnected in local-area networks that reflect the current work group structures within the company and also reflect the sharing of resources and data required by the application programs.

The ability to communicate with other workstations is naturally found on virtually all systems. The telling difference, however, is the number of communications protocols that each workstation can use. Not all workstations can communicate on multiple kinds of networks. It is extremely important that communications issues such as these be resolved and standardized early on in the evaluation and selection process.

Many of the negative issues with personal computers in corporations today result from their becoming part of the corporate culture without ever having been accepted into the corporate data flow.

Similar inattention to the influx of high-performance workstations will have dire results because their higher potential for data storage leads to much bigger incompatibility issues and translation problems.

If a pool of workstations exists, then time on the system must be arbitrated among the people competing for its use. Generally, there will be fewer workstations available than the number of people who can use them.

An alternative is to dedicate a workstation to a particular user. Such system dedication suffers in one respect — the workstation pool strategy enforces a uniformity of backup by each user. It takes few losses of data to teach an operator the need for consistent file use.

Further, crucial data requires that safety measures be taken above standard backup procedures, including additional hardware for backup purposes and perhaps duplicate spare workstations. Tape backup and maintenance in a vault — a relatively common practice on mainframes — should be seriously considered.

Successful evaluation and selection hinges on a primary examination of the application to be executed on the workstation. This step involves both accurately assessing the current manner in which day-to-day operations are conducted and defining expectations of how work will be done in the future.

While a high-performance workstation may be most effectively used with new work procedures, changing existing work patterns can be dangerous. Job performance is enhanced much more readily if automation is a natural extension of current work patterns.

Do not expect a workstation to increase work activity levels instantly. Useful applications implementation involves more than the system hardware and applications software; it also depends upon the people who perform the application. Because workstations are by their very nature interactive, the interface between user and application is critical to the ultimate success of the entire workstation project.

For instance, a small manufacturing company desires a workstation publishing application to perform in-house documentation and manual updates. Issues that must be addressed include the number of people who create the initial documentation, those who edit and proof the documents in preparation and the employees responsible for final production approval.

Thus, the current paper flow must be examined to see how a workstation fits into the established schemes with minimal disruption — or how

Continued on next page




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Continued from previous page

the paper flow must be changed to accommodate all who use the workstation.

The second step is to choose the appropriate software and hardware combination. Software should be examined first since any system is only as good as the applications it can run.

There are a number of excellent software packages available for publishing applications. Since these programs differ both in features and target audience, the software capabilities selected will, in turn, determine the number and kind of input terminals needed, the kind of printers and the optional user input devices — mice, light pens and so on. Most of the sophisticated publishing packages currently require resolution displays of 600 by 400 pixels or higher.

The majority of today's workstations support only one of those displays, allowing only one operator at a time to work. Subsequently, the number of workstations required becomes application dependent and may involve multiple operator shifts with one workstation or one operator shift with multiple workstations.

The criteria for workstation selection should usually be economic. After a tentative software and hardware selection is made, the costs associated with a workstation application can be determined. They include the direct costs — software, hardware and installation — as well as the indirect costs — operator replacement and training and temporary loss of productivity.

An accurate assessment of the potential savings offered by workstation implementation requires taking stock of existing operating expenditures. In the workstation publishing example, current costs include typesetting, artwork preparation, update expenses and so on.

Automating a function should always result in substantial cost savings. If the application software provides a function for which real competitive advantages and end-user benefits result, then significant cost savings and profits can be realized.

After evaluating the costs associated with workstation acquisition and operations, the difference — cost vs. savings — can be determined. Generally speaking, several workstation alternatives must be examined because each software and hardware combination offers different benefits and capabilities at varying prices.

> ***The progress of Unix toward becoming the standard operating system for technical workstations appears unstoppable.***

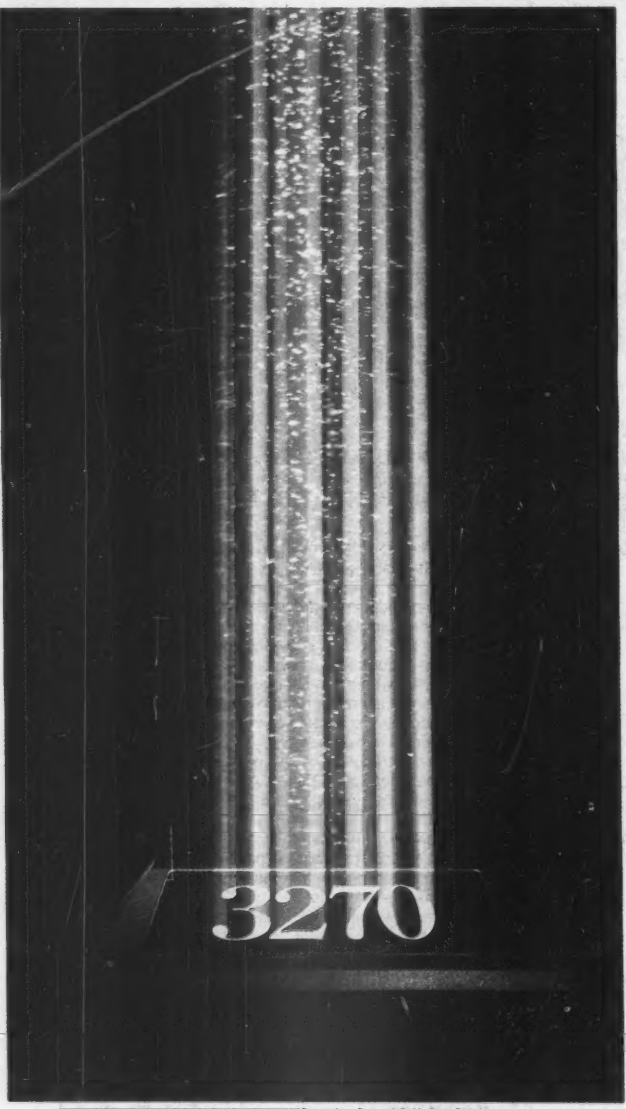
Existing equipment within a company may tip the scales in favor of one particular workstation. Factors such as this should be evaluated on a cost basis and factored into the evaluation.

A workstation selection strategy, however, involves a number of issues not directly related to a specific piece of equipment. Choosing a hardware system is a very temporal issue: Today's top performer becomes quickly outdated in the rapidly changing technology of technical workstations.

The more successful tact is to let the applications software dictate the appropriate system implementation. To reach an informed purchasing decision, clearly defined software needs must first be outlined. Only after applications requirements have been identified is it possible to know what your system must do, how it will be used and what kind of growth can be expected.

Beyond software applications, workstation purchase considerations must include compatibility with industry standards, system upgradability, high-resolution graphics, strong price/performance and support.

A thorough investigation should entail arranging for vendor product demonstrations and interviewing current users of the system under consideration. Upon completion of the above-mentioned procedures, the workstation offering the best return on investment can be determined. ■




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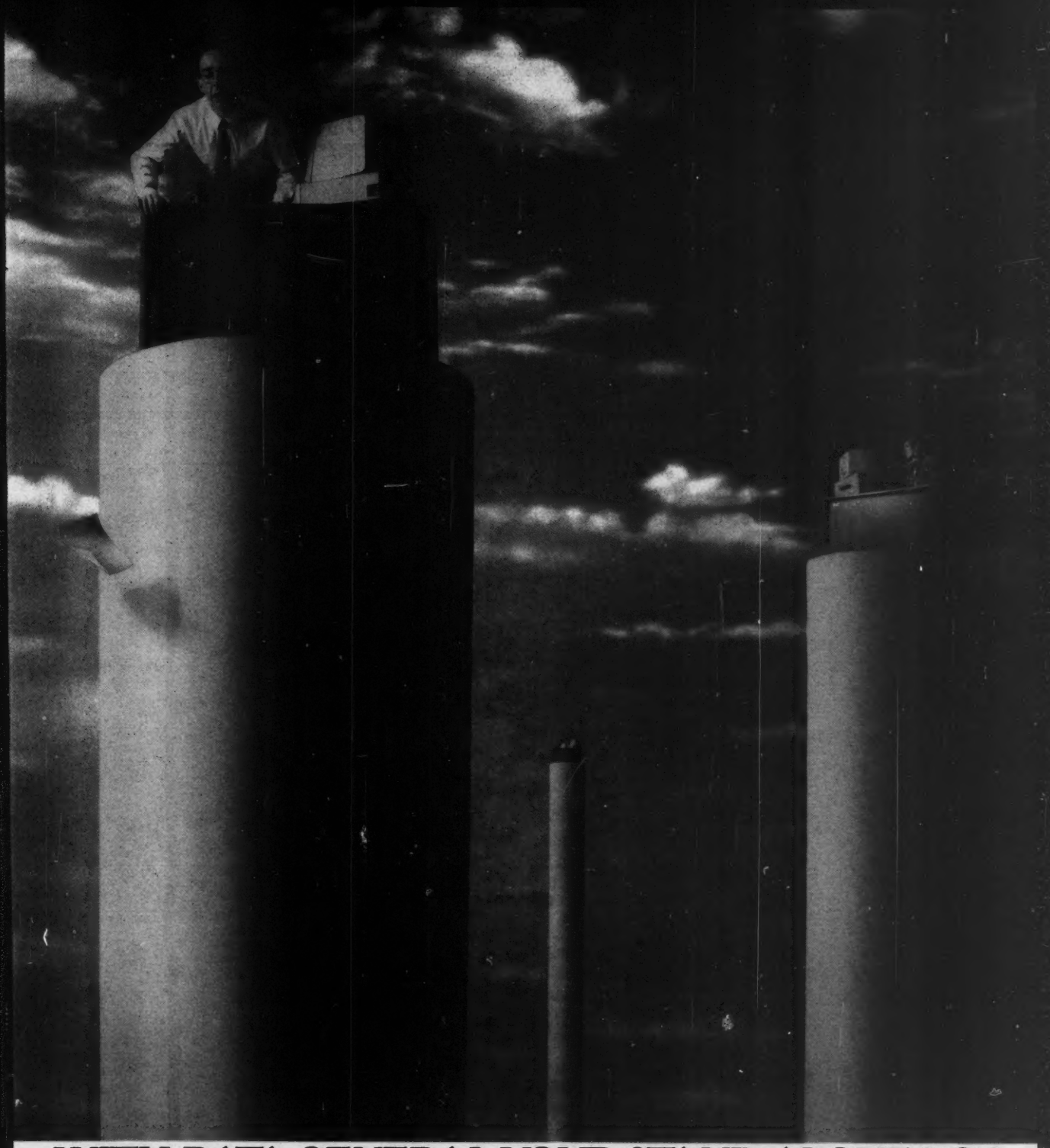
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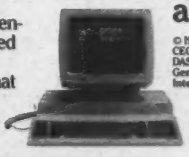
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# 32-BIT TECHNICAL/ENGINEERING WORKSTATIONS*

| Vendor/Product | CPU (Microprocessor) | Clock Rate | Performance (MIPS)[1] | Main Memory Range (Bytes) | Hard-Disk Storage: Minimum Configuration (Bytes) | Hard-Disk Storage: Maximum Configuration (Bytes) | Operating System | Networking | Graphics: Support | Graphics: Resolution (Pixels) | Graphics: Dedicated Graphics Chip or Board | Graphics: Dedicated Floating-Point Processor | System Price Range |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Adage, Inc.**<br>1 Fortune Drive<br>Billerica, Mass. 01821<br><br>6500 | Proprietary | 40 MHz | 1 | 1M-16M | 105M | 380M | Proprietary | Ethernet | Tektronix, Inc. 4014; MacNel Swendler Anvil; Gecae International Ideas | 1,024 by 1,024 | Yes | Yes | $38,000-$60,000 |
| **Apollo Computer, Inc.**<br>330 Billerica Road<br>Chelmsford, Mass. 01824<br><br>Domain Series 3000 Personal Workstation | Motorola, Inc. 68020 | Not available | 1.2 | 2M-4M | 72M | 72M | Aegis (proprietary), AT&T Unix System V, University of California at Berkeley 4.2 | Proprietary, Ethernet, TCP/IP[2], X.25, IBM's Systems Network Architecture | Sigraph Core; Digital Research, Inc. Graphics Kernel Systems; 4014 | 1,024 by 1,280 | Yes | Yes | $9,900-$19,400 |
| **Apollo**<br><br>DN570, DN580 | 68020 | 16 MHz | 1.3 | 2.3M-16M | 69M | 308M | Same as above | Same as above | Same as above | 1,024 by 1,280 | Yes | Yes | $29,900-$70,000 |
| **AT&T**<br>1 Speedwell Ave.<br>Morristown, N.J. 07960<br><br>AT&T 3B2/310 | Western Electric Co. 32100 | 10 MHz | 1.15 | 1M-2M | 30M | 72M | Unix System V | Ethernet | Not available | Not available | No | Yes | $13,950-$18,900 |
| **Cadmus Computer Systems, Inc.**<br>600 Suffolk St.<br>Lowell, Mass. 01854<br><br>9800 series | 68020 | 16.7 MHz | Not available | 2M-16M | 85M | 454M | Unix System V | Ethernet, TCP/IP | Proprietary | 1,000 by 800 | Yes | Yes | $12,000-$35,000 |
| **Calcomp, Inc.**<br>2411 W. Lepalma<br>Anaheim, Calif. 92801<br><br>System 25 | Motorola 68010 | 10 MHz | 1 | 1M-6M | 85M | 948M | AT&T Unix System III, Berkeley 4.2 | Ethernet, Xerox Corp. Network System | Proprietary | 1,024 by 1,280 | Yes | Yes | $60,000-$90,000 |
| **Celerity Computing Co.**<br>9692 Via Excelencia<br>San Diego, Calif. 92126<br><br>C 1200 | Proprietary | 40 MHz | 2.3 | 4M-24M | 140M | 14G | Berkeley 4.2 | Ethernet; TCP/IP; Sun Micro-systems, Inc.'s Network File System | Sigraph Core | 1,024 by 1,280 | Yes | Yes | $50,000 |
| **Celerity**<br><br>C 1230 | Proprietary | 40 MHz | 3.25 | 4M-24M | 337M | 22G | Berkeley 4.2 | Same as above | Sigraph Core | 1,024 by 1,280 | Yes | Yes | $75,000 |
| **Celerity**<br><br>C1260 | Proprietary | 40 MHz | 6.15 | 4M-24M | 337M | 44G | Berkeley 4.2 | Same as above | Sigraph Core | 1,024 by 1,280 | Yes | Yes | $110,000 |
| **Convergent Technologies, Inc.**<br>2700 N. First St.<br>San Jose, Calif. 95150<br><br>Mightyframe/JWS | 68020 | 12.5 MHz | 2-3 | 1M-16M | 50M | 2.4G | Unix (proprietary version) | SNA, X.25, Ethernet, TCP/IP, proprietary | GKS | 1,024 by 1,280 | Yes | Yes | $25,000-$35,000 |
| **Data General Corp.**<br>6300 Syracuse Expwy.<br>Englewood, Calif. 80111<br><br>7500 | Proprietary | 25 MHz | 1 | 2M-10M | 40M | 240M | Proprietary | Ethernet | GKS, proprietary | 1,024 by 800 | Yes | Yes | $18,900-$31,000 |
| **DG**<br><br>7700 | Proprietary | 25 MHz | 1 | 2M-14M | 70M | 240M | Proprietary | Ethernet | GKS, proprietary | 1,024 by 800 | Yes | Yes | $25,000-$53,000 |
| **Digital Equipment Corp.**<br>P.O. Box 1003<br>Mailstop MROB-1/E13<br>Marlboro, Mass. 01752<br><br>Vaxstation II | Proprietary | Not available | Not available | 2M-9M | 33M | 213M | Unix (proprietary version) VMS | Ethernet, TCP/IP, Decnet | GKS | 1,024 by 864 | Yes | Yes | $26,500-$48,000 |
| **DEC**<br><br>Vaxstation II/GPX | Proprietary | Not available | Not available | 3M-9M | 71M | 213M | Unix (proprietary version), VMS | Ethernet, TCP/IP, Decnet | GKS | 1,024 by 864 | Yes | Yes | $33,000-$54,000 |
| **DEC**<br><br>VS 500 | Proprietary | Not available | Not available | 2M-9M | 33M | 213M | VMS | Ethernet, TCP/IP, Decnet | GKS | 1,280 by 1,024 | Yes | Yes | $47,000-$90,000 |
| **Hewlett-Packard Co.**<br>3404 E. Harmony Road<br>Fort Collins, Colo. 80525<br><br>HP 9000 | 68010 or 68020 | 10-16.6 MHz | 1.5 | 7.5M-16M | 10M | 404M | Basic, Unix (proprietary version) | Proprietary | Proprietary | 1,024 by 768 | Yes | Yes | $5,750-$50,000 |

* The companies included in this chart responded to a recent telephone survey by *Computerworld*. Further product information is available from the vendors.
[1] Million instructions per second
[2] Transmission Control Protocol/Internet Protocol

CW Chart Compiled by Cheryl Tynan

## Product Spotlight/32-Bit Workstations

| Vendor/Product | CPU (Microprocessor) | Clock Rate | Performance (MIPS) | Main Memory Range (Bytes) | Hard-Disk Storage: Minimum Configuration (Bytes) | Hard-Disk Storage: Maximum Configuration (Bytes) | Operating System | Networking | Graphics: Support | Graphics: Resolution (Pixels) | Graphics: Dedicated Graphics Chip or Board | Graphics: Dedicated Floating-Point Processor | System Price Range |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **HP**<br>Series 500 | Proprietary | 18 MHz | 1 | 2M-10M | 10M | 404M | Basic, Unix (proprietary version) | Proprietary | Proprietary | 1,024 by 768 | Yes | Yes | $20,000-$60,000 |
| **IBM**<br>Contact local marketing representative<br>IBM RT Personal Computer 6151 Model 10 | Proprietary | Not available | 1.6-2.1 | 1M-3M | 40M | 40M | Unix (proprietary version) | Proprietary | Proprietary | 1,024 by 768 | No | Optional | $11,700-$19,510 |
| **IBM**<br>IBM RT PC 6150 Models 20, 25, A25 | Proprietary | Not available | 1.6-2.1 | 1M-4M | 40M | 210M | Unix (proprietary version) | Proprietary | Proprietary | 1,024 by 768 | No | Optional | $11,700-$19,510 |
| **Masscomp Co.**<br>1 Technology Park<br>Westford, Mass. 01886<br>MC 5400P | Proprietary | 16.7 MHz | 2.3 | 2M-10M | 71M | 142M | Proprietary | Ethernet, X.25, Unix System V, Berkeley 4.2 | Sigraph Core, GKS, proprietary | 1,152 by 910 | Optional | Optional | $18,400-$23,400 |
| **Masscomp**<br>MC 550P | 68010 | 10 MHz | 0.7 | 2M-8M | 71M | 266M | Proprietary | Same as above | Same as above | 1,152 by 910 | Optional | Yes | $34,400-$60,000 |
| **Metheus**<br>P.O. Box 1049<br>Hillsboro, Ore. 97123<br>LANbda Engineering Workstation | Motorola 68000 or 68020 | 12-16 MHz | Not available | 16M | 80M | Not available | Berkeley 4.2 | Ethernet | GKS, proprietary | 1,024 by 768 | Yes | Yes | $20,000-$60,000 |
| **Ridge Computers, Inc.**<br>2451 Mission College Blvd.<br>Santa Clara, Calif. 95054<br>32/130 | Proprietary | 8 MHz | 2-4 | 4M-16M | 150M | 300M | Unix (proprietary version) | Ethernet, TCP/IP | Sigraph Core, GKS | 1,024 by 784 | Yes | Yes | $39,700 |


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| | TI820 Data Terminal PKG KSR | 1,995 | 192 | 107 | 72 |
| | TI855 Dual Mode Printer | 649 | 63 | 35 | 23 |
| | TI865 Dual Mode Microprinter | 810 | 78 | 43 | 29 |
| WYSE | WY50 Video Terminal | $ 459 | $ 44 | $ 25 | $ 17 |
| | WY75 Video Terminal | 559 | 56 | 30 | 20 |
| | WY85 Video Terminal | 495 | 47 | 27 | 18 |
| PANASONIC | FT70 Executive Partner PC with 640K RAM | $2,395 | $229 | $128 | $ 87 |
| NORTHERN TELECOM | NT6K90 Displayphone Plus | $ 995 | $ 97 | $ 54 | $ 37 |
| CITOH & CIE | CIT-220+ Video Terminal | $ 775 | $ 75 | $ 42 | $ 28 |
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| | CI-3500 Serial Printer | 1,550 | 149 | 83 | 56 |

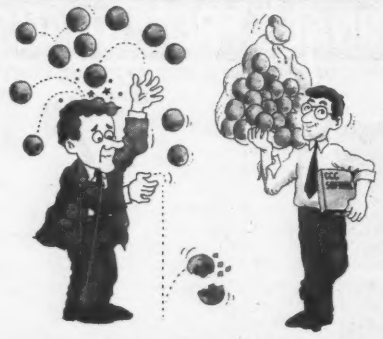
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## Product Spotlight/32-Bit Workstations

| Vendor/Product | CPU (Microprocessor) | Clock Rate | Performance (MIPS) | Main Memory Range (Bytes) | Hard-Disk Storage: Minimum Configuration (Bytes) | Hard-Disk Storage: Maximum Configuration (Bytes) | Operating System | Networking | Graphics: Support | Graphics: Resolution (Pixels) | Graphics: Dedicated Graphics Chip or Board | Graphics: Dedicated Floating Point Processor | System Price Range |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ridge Computers** 32/330 | Proprietary | 8 MHz | 2-4 | 8M-16M | 300M | 600M | Unix (proprietary version) | Ethernet, TCP/IP | Sigraph Core, GKS | 1,024 by 784 | Yes | Yes | $53,200 |
| **Ridge Computers** 32/530 | Proprietary | 8 MHz | 2-4 | 12M-16M | 600M | 600M | Unix (proprietary version) | Ethernet, TCP/IP | Sigraph Core, GKS | 1,024 by 784 | Yes | Yes | $70,700 |
| **Saber Technology Corp.** 2381 Bering Drive San Jose, Calif. 95131 Saber Station | National Semi-conductor Corp. 32000 series | 10 MHz | 1 | 2M-12M | 80M | 160M | Berkeley 4.2 | Ethernet, TCP/IP | GKS, Virtual Device Interface, proprietary | 1,664 by 1,248 | Yes | Yes | $45,000-$100,000 |
| **Silicon Graphics, Inc.** 2011 Stierlin Road Mountain View, Calif. 94043 Iris 3020 | 68020 | 16 MHz | 1.5-2 | 2M-16M | 72M | 72M | Unix System V, Berkeley 4.2 | Ethernet, TCP/IP | GKS, proprietary | 1,024 by 768 | Yes | Optional | $42,900 |
| **Sun Microsystems, Inc.** 2550 Garcie Ave. Mountain View, Calif. 94043 Low End 3 Flash 50 | 68020 | 15 MHz | 1.5 | 4M | 71M | 142M | Berkeley 4.2 | Ethernet | GKS | 1,152 by 900 | No | Optional | $7,900-$13,900 |
| **Sun Microsystems** 3-160C | 68020 | 16.67 MHz | 2 | 4M-16M | 71M | 1.3G | Berkeley 4.2 | Ethernet | GKS | 1,152 by 900 | Optional | Yes | $34,900-$50,000 |
| **Tektronix, Inc.** P.O. Box 1700 Beaverton, Ore. 97075 6130 Intelligent Graphics Workstation | National Semi-conductor 32016 | 10 MHz | 0.6 | 1M-8M | 20M | 80M | Unix (proprietary version) | Ethernet | Tektronix 4100, 4120 series | 1,024 by 1,280 | No | Yes | $9,950-$20,000 |

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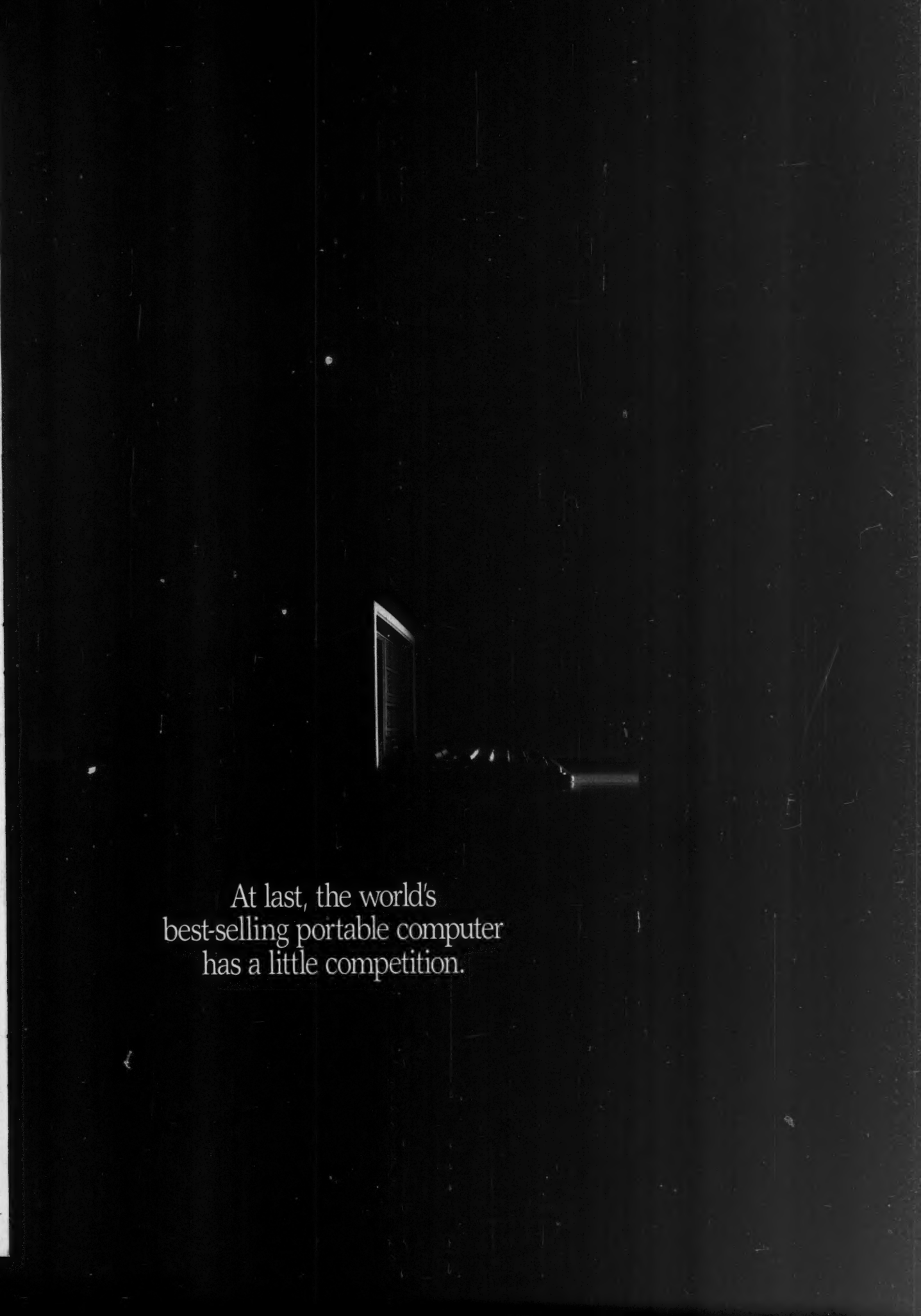
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**Expansion Slots** • 2 available slots in all configurations

**Memory** • Up to 640 Kbytes of RAM on the main system board, expandable to 2.1 Megabytes without using an expansion slot. Maximum system memory of 4.1 Megabytes using only one expansion slot

**Interfaces** • RGB color monitor, RF modulator, composite video, parallel printer, and asynchronous communications interfaces

**Keyboard** • Modified IBM PC-AT layout (84-key)

**Display** • 9-inch diagonal green monochrome dual-mode monitor • High-resolution text and graphics

**Physical Specifications** • 17.7"W × 7.5"H × 13.9"D • 45cm × 19cm × 35cm

**Options** • MS-DOS®/BASIC version 3.1 diskettes and reference guide • 512/1536-Kbyte system memory board • 512/2048-Kbyte memory expansion board • 512-Kbyte memory upgrade kit • Automatic power switching board (110 to 220 volts) • 10-Megabyte fixed disk drive • 360-Kbyte diskette drive • Carrying case • Technical Reference Guide (available Q2 1986)

CONFIGURATIONS

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**Model 3** • 640 Kbytes of RAM • One 360-Kbyte diskette drive • One 10-Megabyte fixed disk drive • Two expansion slots available • 26.2 lbs./11.8kg

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**In Depth**

# 'Should I buy applications software or develop it in-house?'



CW PHOTOS

## Software vendor:

***'Given the economic and timing advantages of purchasing software, why would anyone still build his own software? The objective of DP is to deliver economic solutions, not to outdesign every vendor's solution.'***

By GARY DURBIN

To maintain a leading edge, an organization must run more effectively than its competition. With this in mind, managers often see the acquisition of high-quality mainframe applications software as a strategic step in positioning a business ahead of its rivals.

A corporate decision on whether to buy or build mainframe applications software can be examined from three different angles: development factors, implementation factors and strategic business factors. Managers should evaluate such factors according to the skills, resources, costs and time frame required to set a system in place.

Initially, the cost of many mainframe software package products may appear prohibitive. This is especially true if these systems are not tailored to a company's particular needs by the vendor. However, even the most cursory examination of the buy vs. build discussion usually reveals that quality purchased software can save a company hundreds of man-hours and hundreds of thousands of dollars over in-house development efforts.

Making the decision to develop applications software in-house means a commitment must be made to plan and budget for the completion of all of the complex phases of development. A company must be prepared to make a significant financial commitment to complete such a project successfully. Management must find the personnel capable of completing each phase of development and find a reliable manager to oversee the project.

Continued on page 60

*Durbin is chairman of Tesseract Corp., a San Francisco-based vendor of human resource software.*



## Independent consultant:

***'A simple answer is a lot easier to find than the right one. DP's real responsibility is to deliver the maximum within the budget, whether that means buying software, developing it in-house or reallocating resources.'***

By F. ARNOLD ROMBERG

Are DP/MIS managers in large organizations better off buying ready-made applications software from outside vendors or developing applications in-house? That sounds like a simple question, but it's not. Any simple answer can be only fortuitously right for your particular situation.

The question being asked is not just whether to buy or make applications software. The question also is not whether performing in-house software development is worthwhile. A small organization with only one full-time data processing professional should probably be doing some in-house software development. At the other end of the scale, with the possible exception of IBM, the largest organizations are the biggest software buyers.

The real question is this: Which software should be developed in-house, and which should be purchased?

A simple answer to this question is a lot easier to find than the right one. Furthermore, the simple answers have a lot of logic behind them. Software vendors emphasize, quite rightly, that since their rewards depend on software excellence, their organizations often have resources, experience and technology far beyond the command of the average MIS manager.

However, vendors cannot possibly know particular company requirements and circumstances as well as the MIS manager and on-site staff do; the user company's needs certainly should be considered in establishing its arsenal of applications software. Most systems analysts and programmers are confident that, given enough time, they can do anything, but users want

Continued on page 66

*Romberg is founder of Romberg & Romberg, Inc., a Dallas-based computer systems consultancy.*

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**Continued from page 59**

Considering the full expense and variety of skills needed to develop in-house software, purchasing applications software becomes a very economical solution.

In most instances, vendors already have completed several of the development phases; user guides, operations guides, documentation, specifications and testing should be immediately available. The result is a quality, pretested product at a price lower than that of comparable tools developed in-house.

The average cost per line of code for purchased software falls between $1 and $2. In contrast, in-house applications software costs from $40 to more than $100 per line of code.

With a complex data base-oriented application often containing more than 100,000 lines of code, building software is obviously an expensive process; building quality software, therefore, is a very expensive process.

### Phases of development

In order to assure quality development, most professionals use a more or less standard process that moves through several phases.

While a corporation may have the qualified staff available to create software in a particular application area, one of the benefits of off-the-shelf software is that these valuable staff members are not pulled away from their jobs for long periods and asked to become systems experts.

Instead, companies that choose to buy applications software rely on outside experts, freeing key staff members to perform other functions.

Each phase of applications software development requires a corporation to have subject matter experts and DP and project management personnel with specialized skills.

While some overlap exists from phase to phase, the essential phases are as follows: researching requirements, specifications development, internal system design, program development, user guide development, operations guide development, user procedures development, system testing and implementation.

> ***Building software is an expensive process; building quality software is a very expensive process.***

**The requirements phase**, the initial phase of any system development, involves creation of a clear statement of business needs, definitions of current and proposed procedures and a cost/benefit analysis. Those involved with the requirements document must have analytical skills and extensive experience in all aspects of the application, including historical and future trends. These experts are not simply users with spare time on their hands.

**Specifications**, the second phase, must be developed from general requirements to detailed design. Specifications should describe in nontechnical terms what the system does and how it does it. The writer must have a solid conceptual knowledge of the entire system.

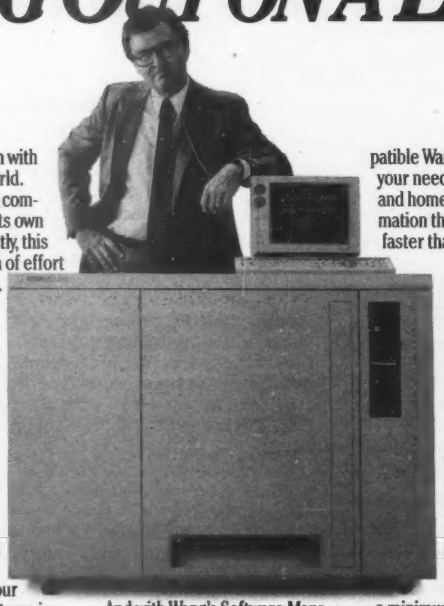
**The internal design phase** requires programming expertise and system design skills. Corporate programmers and systems designers must work together to develop an architecture that allows for current requirements as well as anticipated changes.

**Program development** includes data base and file definition, program coding and integrated testing. During this phase, attention to detail and a firm grasp of the system objectives are required.

**Developing a user guide** requires outstanding documentation and communication skills. This document must translate the design of the system into "how to" statements in nontechnical, end-user language. Complete system knowledge is essential


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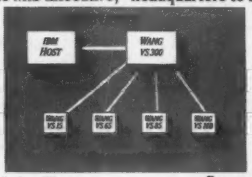
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to create this document.

**The operations guide** must reflect clearly and accurately all technical operations of the system. The skills needed to produce the guide include operation design knowledge as well as documentation skills, a rare combination.

**User procedures** explain all procedures that end users must follow to accomplish the system objectives. A complete knowledge of the company as well as effective documentation skills are necessary. As with the user guide, the language used in this step must be both specific and nontechnical.

**The system test** is one of the most time-consuming phases in system development. Test cases are developed to exercise all functions of the system fully. Any unanticipated problems not uncovered in this stage could go undetected until they arise in actual use. Application knowledge is central to this phase.

The final phase, **implementation**, requires the implementation of data conversion, training and procedures. This phase requires excellent management and communications skills.

Successful project managers require perhaps the rarest combination of skills to prevent in-house development projects from being held up. They must be able to plan realistically and evaluate objectively the skills of their personnel.

They also have to provide effective assignment tracking, scope management and truth in tracking. People skills are essential, as is the ability to control change in the project. Of course, applications knowledge is useful as well.

**The costs of new software**

*In-house development methods*

| Development Stages | Traditional | Fourth-Generation | Purchase |
|---|---|---|---|
| Requirements | $300,000 | $300,000 | $200,000 |
| Specifications | 500,000 | 500,000 | 50,000 |
| Internal design | 200,000 | 100,000 | 50,000 |
| Program development | 400,000 | 200,000 | 150,000 |
| User guide | 100,000 | 100,000 | 25,000 |
| Procedure development | 100,000 | 100,000 | 50,000 |
| Operations guide | 100,000 | 100,000 | 50,000 |
| System test | 300,000 | 300,000 | 200,000 |
| Product purchase | 0 | 0 | 200,000 |
| **Total** | $2,000,000 | $1,700,000 | $975,000 |

Source: Teseract Corp.

CW CHART

**A vendor's figures show that fourth-generation languages save on development costs during the internal design and program development stages. Purchasing software can save on each development stage, particularly specifications, program development and documentation.**

#### Economic advantage

In comparison with development, companies purchasing applications software find that the expense of creating the requirements document is greatly reduced, since the vendors have already established the basic parameters of the system. Time normally spent developing specifications instead can be spent evaluating systems to find the best functional and architectural fit.

Because the vendor has created the internal design of the system, that cost also is reduced. Program development tasks give way to tasks associated with adapting the system to unique corporate needs and providing interfaces to other systems within that company.

Since each company has unique policies and procedures, vendors know that customers will need to develop their own user procedures. Companies often call on a vendor's expertise to perform a large portion of that task. Although purchased applications software can typically meet 80% of a company's needs, quality applications software allows users to introduce unique corporate standards into the system.

One of the most time-consuming and, hence, expensive chores in system development is writing test cases. Vendor-supplied systems are frequently delivered with comprehensive test cases. And although users need to perform their own tests to ensure that systems are functional and problem free, vendors should stand ready to provide additional installation help and training.

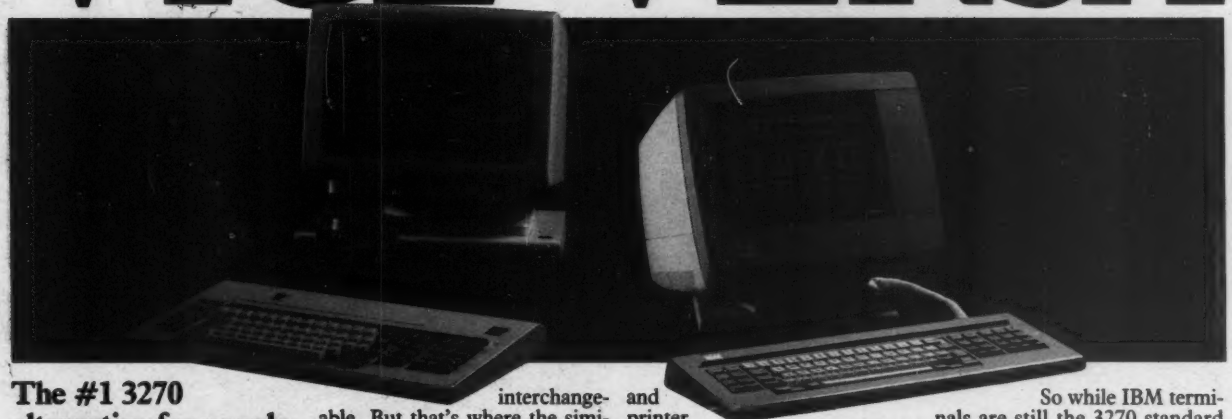
After all, vendors have a vested interest in helping implementation move along quickly: Only when one customer is satisfied should a vendor move on to other client installations.

A typical breakdown of in-house development costs compared with prepackaged application software costs is illustrated in the chart. Based on customers' figures, the model shows that companies can save a potential $1 million by purchasing applications software rather than developing it by traditional methods. Even using efficient, fourth-generation development tools, companies would spend $725,000 more to develop than to buy, according to the model.

#### Availability

Even the best development projects can fail if implementation is not successful. Implementation tasks include data conversion, procedure placement, training and all other tasks essential to successful system

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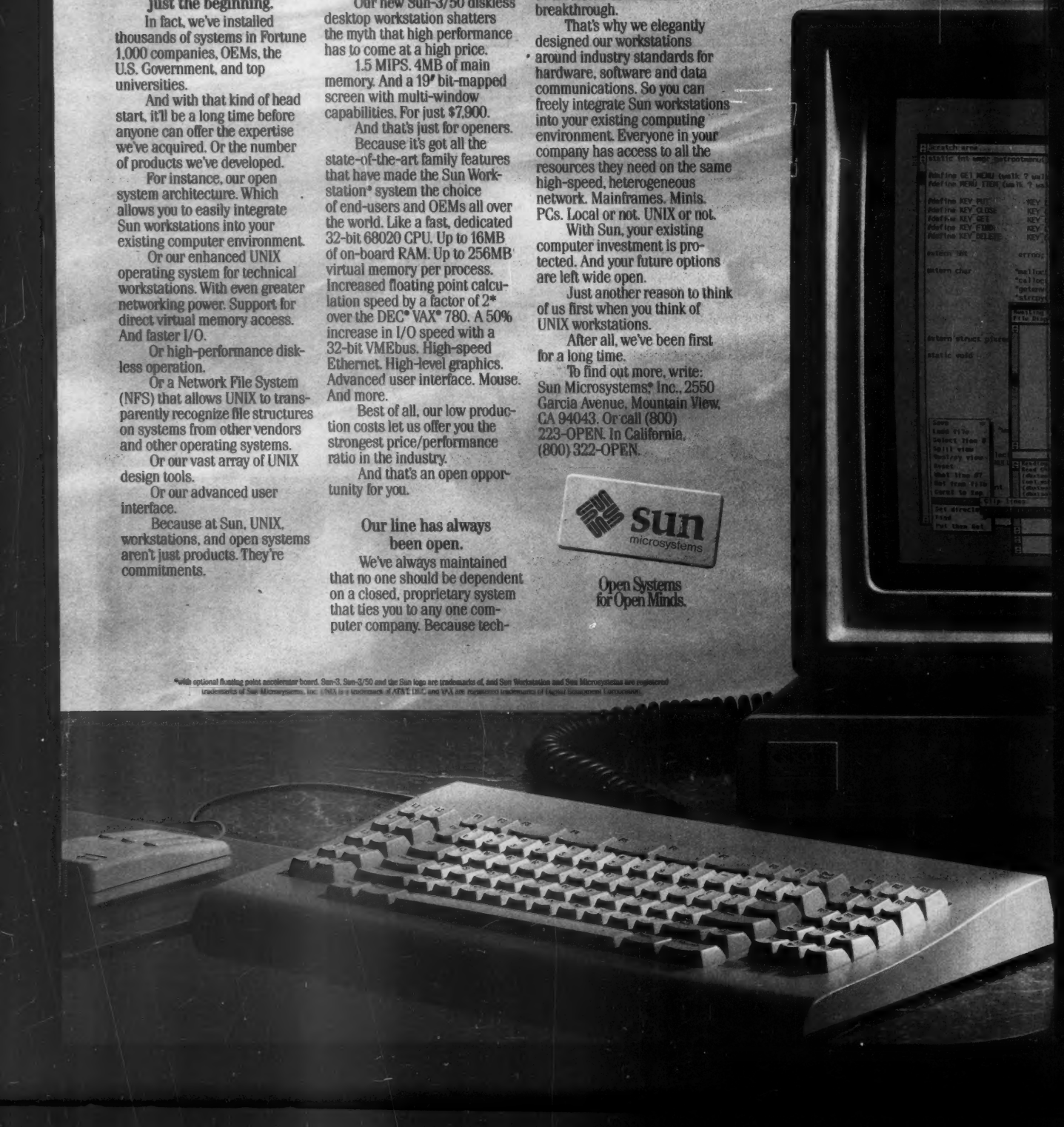
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> ***Current business conditions do not dictate what a company will need in the future. Good packaged software with a flexible architecture will allow for change, providing a company with room to grow.***

transition. Rapid transition is preferred, since the sooner a new system is implemented, the sooner the benefits can be realized.

Packaged software may be available the moment a user discovers a need for it. Once a company identifies the need for a particular application, management can shop the marketplace for software that fits best. Once a purchase decision is made, implementation is not far off.

When buying software from a vendor, a company can focus on its own business and what it wants a software system to do for that business. In a traditional development project, management might spend numerous hours simply deciding what it wants the new system to do.

However, when the same managers shop for a software vendor, evaluation points, which should include system functionality and each product's ability to adapt to corporate needs, can shift emphasis from how functions might be done — software vendor concerns — to how the product can be used best.

A company shopping for a software package actually can see the product before it spends any money. While one company spends money waiting and hoping its in-house software program is what it had envisioned the program would be, another company has seen two different software packages at work without spending a dime on system designers or program developers.

#### Adaptability

Current business conditions do not dictate what a company will need in the future. Good packaged software with a flexible architecture will allow for change, giving a company room to grow.

Other users of the software may expand it in areas not contemplated by a designer focusing on one company. A vendor has the advantage of a wide range of users to ensure that all inappropriate constrictions in the software are eliminated.

If applications requirements change rapidly, will your in-house systems adapt without major reinvestment?

Applications software systems have a useful life of zero to 20 years, depending on product design, potential obsolescence and outside factors (see chart next page). If a system's architecture is not sophisticated enough to handle and adapt to these factors, a company may waste its investment while the DP professionals scramble to redesign the system to keep up with continual change.

Packaged applications software can be evaluated for its reliability, service and flexibility by vendor success and customer satisfaction. Software vendors put their reputations on the line every time they sell a product.

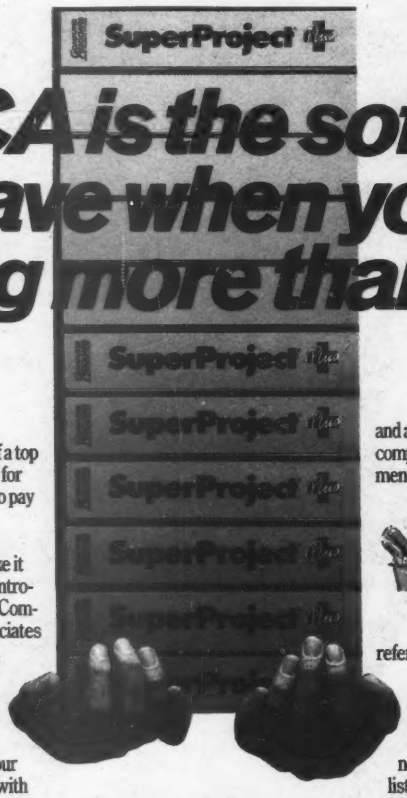
A company shopping for software can measure the flexibility of the product it wishes to purchase by evaluating the customizing costs incurred by the vendor's existing product customer base.

#### Service and maintenance

Many software vendors provide ongoing training and retraining for user personnel as well as periodic system upgrades and enhancements as part of the annual system maintenance fee. Users can ask systems experts at the vendor company to provide ongoing information on ways in which they can get better use from the software system.

Although some in-house DP shops provide 24-hour hot-line support to solve user problems, such support is


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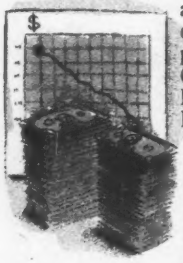



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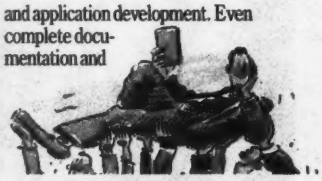
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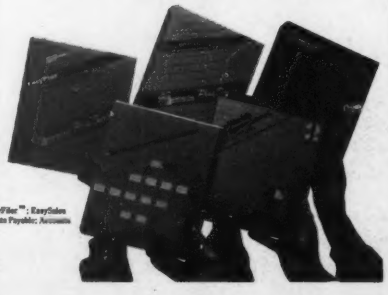
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standard fare from most applications software vendors.

Another key advantage of packaged applications software is a partial by-product of the number of users working with the system. Often a vendor creates system enhancements based on user feedback. The synergistic effect is that many users working with the same applications software can bring enhancements at a faster rate than those provided by vendors of lesser used systems.

Considering the fact that just one major system enhancement can materially increase the value of an applications software system, a user company relying on vendor R&D usually realizes a better return on its maintenance dollars than a company relying on its own in-house staff.

### The strategic advantage

Given the clear economic and timing advantages of purchasing software, why would anyone still build? Why is the in-house DP organization still the applications software company's biggest competitor?

**Factors causing requirements to change**

- **a.** New practices and policies
- **b.** Reporting decisions and needs
- **c.** New management systems and organizational changes
- **d.** Hardware changes
- **e.** Government regulation changes
- **f.** Changes in the economy
- **g.** Technological changes
- **h.** Competitive pressure

CW Chart

**Both internal and external factors can cause a firm's software requirements to change over time.**

The answers appear to be numerous:

- Packaged applications systems do not fit the company's unique characteristics.
- The vendors' products are not of suitable quality.
- The products do not fit or measure up to internal standards.
- The products cannot be integrated into other related standards.
- The products cannot be integrated into other related systems or a corporate data architecture.

Although sometimes these objections may be real and well founded, just as often they are symptoms of a data processing organization that has an unclear view of corporate objectives.

Instead of leveraging its most talented people, using them to bring systems on-line quickly through purchased products, the organization endlessly multiplies the applications backlog.

Since top-quality systems designers are very scarce, shouldn't they be used to develop those applications for which no product alternative exists? Then, instead of pushing economically justified systems into year five of the corporate five-year plan in favor of more "critical" systems or spending tedious hours arguing over the relative priority of badly needed applications systems, management can concentrate on meeting business objectives.

> ***Considering the fact that just one major system enhancement can materially increase the value of an applications software system, a user company relying on vendor R&D usually realizes a better return on its maintenance dollars than a company relying on its own in-house staff.***

By clearly establishing that the data processing department's objective is to deliver economic solutions, top management's attitude can shift easily from one in which the first impulse is to outdesign any vendor's solution to one in which the desire is to find ways to use a vendor package effectively in the context of corporate objectives and professional standards.

### Positioning to compete

Given the enormous power of today's on-line, interactive applications systems to automate offices, production lines and other business processes, those firms taking advantage of the current generation of applications products will quickly outdistance their more insular brethren.

By bringing higher employee productivity, better management information and faster adaptation to change, the use of "fifth-generation" applications products that can adapt more rapidly to changes will bring a positive effect to the firm's bottom line more quickly, and user companies will be better positioned to compete.

Companies bogged down in implementing systems using traditional methods will either adjust to the realities of the economics and risks of software development or find themselves outpaced by more flexible competitors. Considering the short- and long-range impacts on corporate results, purchased applications software clearly should be the preferred strategy. ■

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If you need any of these UNIX-based products or services, why not go with the computer company with the vision to see the future? After all, any company can have 20/20 hindsight.

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> ***Though it may appear that in a larger company conditions would favor in-house development, the opportunities for profitable use of DP multiply correspondingly so that the size of the company is not itself significant.***

**Continued from page 59**

more good applications software available at reasonable costs right now.

The only quick answer to the above question is this: The MIS manager's real responsibility is to deliver the most data processing for the budgeted resources. This means buying software when it is a good buy, making software that cannot be bought and carefully allocating any resources that are left.

But this understanding is not by itself a policy. When is software a good buy? What software cannot be bought? The following considerations generally are arguments for buying.

- Purchased programs spread the development cost over many users. They often provide the lowest cost per executed instruction. The selling price of an applications software package for a large computer is typically 1% of its development cost.
- Because of the large size of the target user group and the distributed cost, a vendor package can be richly endowed with features and options.
- Using a purchased product can eliminate development uncertainties and delays.
- Practical, reliable and effective use of emerging technologies often appears first in vendor software packages. The software industry pursues the technology frontier full-time, something the in-house MIS staff can hardly do.
- Specialized knowledge of techniques and algorithms appears more often in the specialized environments of software firms. Much industry- and technology-specific software expertise is concentrated in vendor companies; at the extreme are such things as tax calculation, critical path project planning, business modeling and linear programming.
- Effective software project management, though much studied, is still an art. A full array of needed skills is more likely to be found in vendor organizations than on users' staffs.
- Because of the wide target user population, software vendors usually do more thorough and varied product testing than the in-house developer. Good testing, together with rapid improvement based on the experience and demands of a large customer base, often produces high-quality software products.

### A custom fit

The following considerations usually favor in-house development:

- Specific capabilities may be needed to support particular methods of operation, competitive advantages or innovations. Company needs should determine the DP capabilities provided, rather than available capabilities molding company operations. An appropriate vendor package offering customization features may not be available for a needed application.
- Vendors seldom offer custom modification to meet individual company needs or source code to allow in-house extensions. When either of these alternatives is available, seizing it often has disastrous consequences because of the maintenance difficulties created.
- Data processing needs continually change, often in ways that a vendor package does not. Improvements and extensions of a vendor package result from vendor-perceived customer community needs, not the specific requirements of a given user.
- In-house development produces the knowledge required for program maintenance. The buyer and user of

**SCIENCE/SCOPE®**

A Very High Speed Integrated Circuit (VHSIC) chip 10 times more powerful than conventional microprocessors is being developed for signal-processing computers for future tactical aircraft radars and for possible upgrading of the APG-65 radar on the F/A-18 Hornet Strike Fighter. The new signal processors will perform up to 30 times faster than current systems, enabling future radars to incorporate such advanced capabilities as simultaneous multimode operation. The chips will allow systems to test themselves and trace faults to the chip level, improving reliability and maintainability. Hughes Aircraft Company builds the APG-65 for the U.S. Navy and Marine Corps F/A-18.

A near-field testing system offers savings in excess of 1% of an antenna's value and allows troubleshooting on each individual element of an antenna. Hughes developed the system as a cost-effective, highly accurate way of testing many shipboard and air defense antennas. It is more practical than far-field testing and allows a greater degree of complexity than previous near-field test systems, while easily duplicating the test data that would be obtained by both methods. Housed in an anechoic chamber, the computer-controlled system moves a waveguide probe through measurement positions as close as a few thousandths of an inch within a 19x26-foot area. The probe position is monitored with a laser interferometer. Information on the antenna's vector radio frequency field is then measured and converted to equivalent far-field pattern data by the system's software.

A new technique may expand the use of lasers in commercial and military applications. The approach, called optical phase conjugation, is considered a major advance in optics because it offers a solution to distortion problems that have limited the use of lasers. When a laser beam passes through a turbulent atmosphere or a severely strained optical component, the beam is distorted and the information it carries is degraded. The Hughes technique, however, forces the laser to retrace its path through the distorting medium so the beam emerges free of distortion. The method eliminates the need for complex electro-optical and mechanical components to correct the distortions.

A private company has assumed the operation of U.S. earth resources satellites, the purpose being to save taxpayers money. Earth Observation Satellite Company (EOSAT), a joint venture of Hughes and RCA, is now operating Landsats 4 and 5. EOSAT will be the primary source for marketing, ordering, and distributing data from these spacecraft. In addition, EOSAT will begin constructing the next-generation commercial Landsat spacecraft. Landsats previously had been acquired by NASA then turned over to the Commerce Department's National Oceanic and Atmospheric Administration. For the past 13 years, Landsat data has been used to map vegetation, mineral resources, and water pollution, and to update land use maps. The new spacecraft, Landsat 6 and 7, are being built by RCA and will carry imaging devices built by the Santa Barbara Research Center, a Hughes subsidiary.

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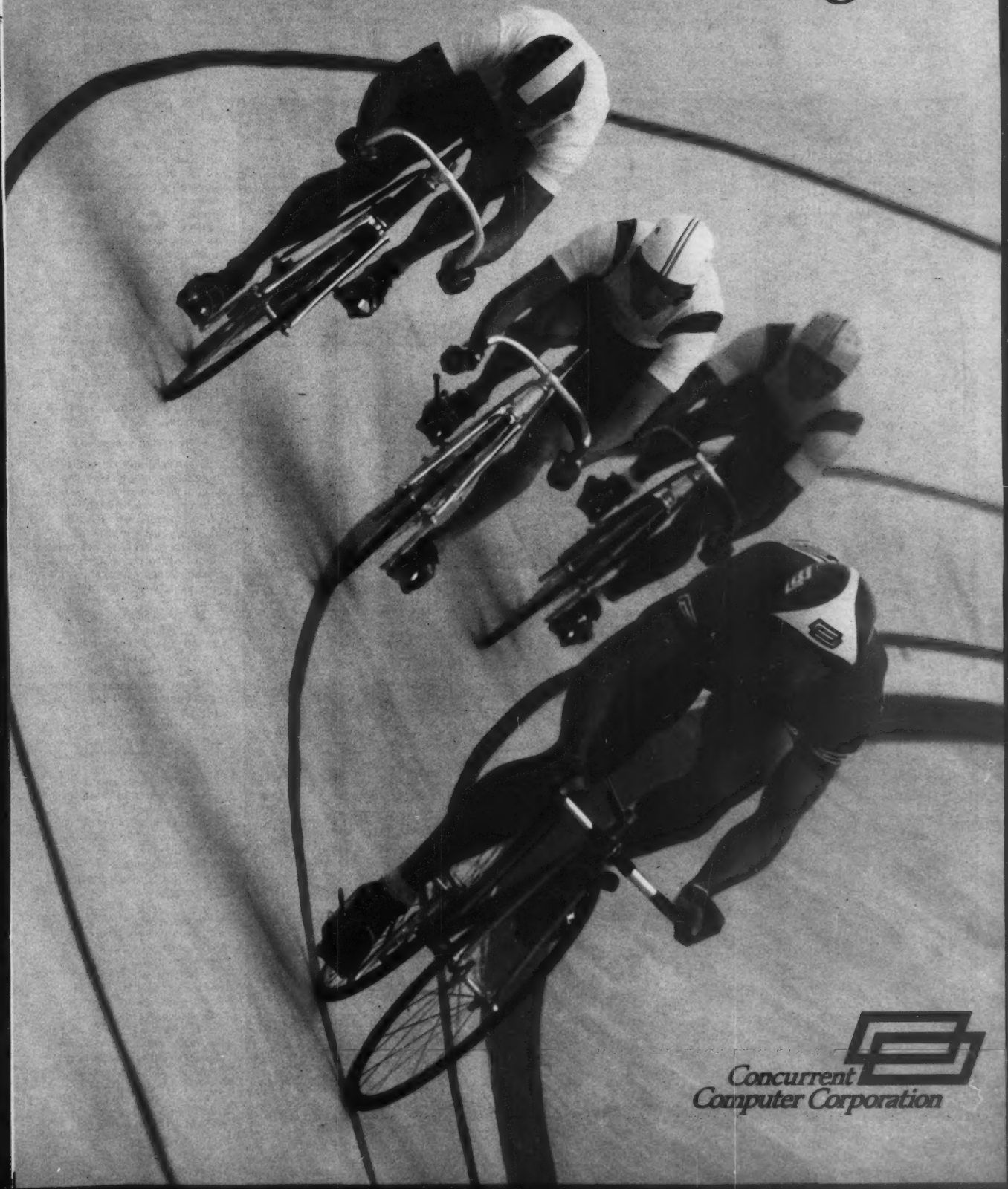
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# Breaking away from the pack requires confidence, momentum and a keen sense of timing.



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an applications software package depends almost wholly on the vendor's aftermarket service for maintenance and bug fixing.

• Effectively interfacing purchased programs with in-house related programs is seldom easy.

• Data security against malice, competition and mishap may be difficult to obtain or to enforce with vendor products.

Company politics is a factor that is always relevant but so particular to individual situations that no general discussion is helpful. The basic principles must be interpreted and applied to each situation.

The assumption here is that the MIS manager or supervising vice-president who does the right thing for the company will be rewarded personally and pass credit on to subordinates who do good work.

Where this is not true, the manager is better off at least knowing what the proper strategy is, even if it must be compromised to fit the situation.

Some considerations do not clearly favor one side or the other. In-house resources are not readily convertible: Payroll budget funds may be available when software package money is not and vice versa, while dollars can seldom buy development time.

Familiarity with the details of the application may be more available in-house, while other needed skills are not. All these considerations are hard to evaluate simultaneously in a given situation.

The assumption that a choice exists in a given case presumes that the in-house MIS staff has the skills needed to evaluate a vendor application software package on the one hand and to manage a development project on the other.

The question of whether these skills are indeed available should be faced squarely and answered clearly before starting to evaluate the more difficult considerations identified earlier.

### Irrelevant factors

Several factors that might seem to be relevant seldom are. For example, though it may appear that in a larger company conditions would favor in-house development, the opportunities for profitable use of DP multiply correspondingly so that the size of the company is not itself significant.

The size of the MIS staff relative to total staff or the percentage of the company budget spent on MIS often indicates the pervasiveness of DP, but it says little about the value received for the resource spent or the availability of the skills and resources needed for a new in-house applications development project.

By the same token, few companies are in businesses so specialized that there are not outside software experts familiar with their applications. In addition, companies heavily involved in defense contracting must give special attention in software planning and management to meeting government security requirements.

### Rules and exceptions

With so many things to take into account, how can a decision be made in a particular case? The problem yields to the approach of making some simplifying assumptions and then adapting the result to the realistic and normal cases where those assumptions are not wholly valid.

First, take the viewpoint of the MIS manager who has a good staff but finite resources and who has a sizable applications creation (make or buy) backlog. This model assumes the following things:

• A group of qualified analysts and programmers.

• Project management skills.

• Adequate resources.

• Freedom to buy application software packages.

• Some, but not entirely, company-specific software requirements.

The main points of the best policy in this case are fairly clear:

• Buy applications software packages when they are clearly cost-effective in the specific environment in which they will be used.

• Write applications in-house that require special knowledge of end-user needs and environments.

• Develop interfaces with and make extensions to purchased programs to integrate them into the whole library of applications software.

• In the unlikely event that in-house MIS resources remain after covering the


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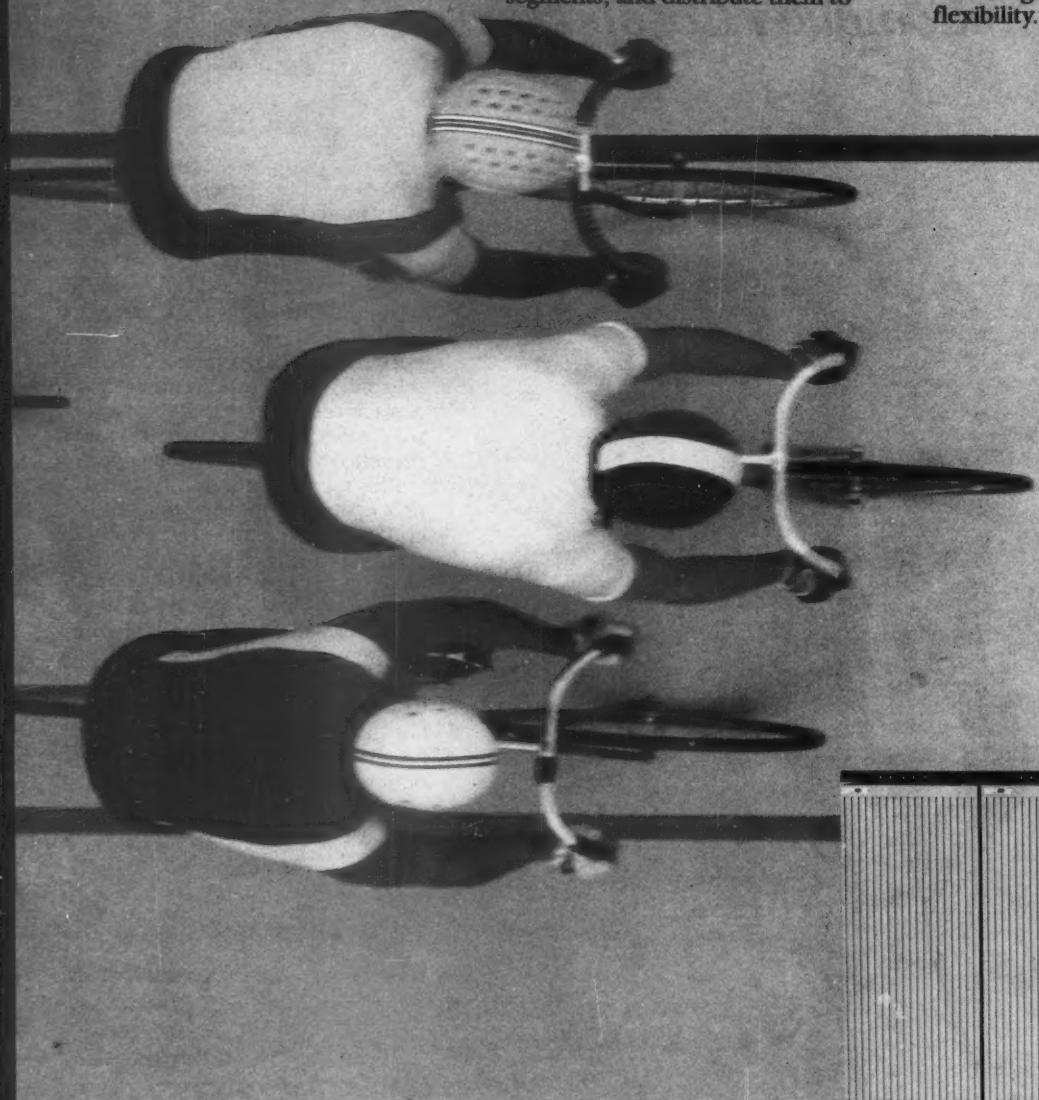
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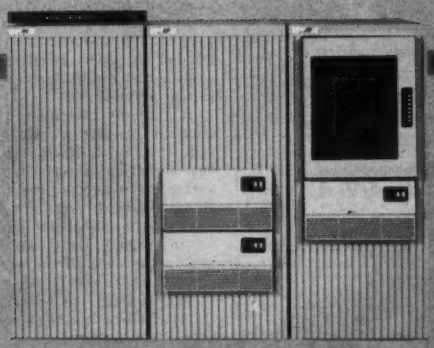
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> ***The ultimate objective is to make the full library of programs work smoothly together so that end users get the processing they need and are only vaguely aware, if at all, that its elements have come from a wide variety of sources.***

above tasks, use them on borderline cases, or, better still, consider diverting them to activities where they will be better spent rather than on applications development. System documentation and improvement or identification and evaluation of new DP opportunities should be considered.

The first point raises another question: When is an application software package cost-effective? A program or package that

— does all or a significant part of the job needed, *and*

— has exceptionally good documentation and vendor support, *and*

— has good interfaces for accepting input data from and passing results to other programs, *and*

— includes specialized technology not available in-house, *and*

— does a relatively standardized application — that is, one that is applicable to a large number of users will almost always be cost-effective. One that fails to meet any one of the first three of these requirements is probably a questionable purchase, even if it is attractive on all other counts.

In-house software development efforts are best spent writing special-purpose modules or systems for specialized needs, providing links between separate systems and creating extensions — but usually not modifications — to purchased software packages. Such extensions include user interfaces for data collection and reporting.

The ultimate objective is to make the full library of programs work smoothly together so that end users get the processing they need and are only vaguely aware, if at all, that its elements have come from a wide variety of sources. This is the objective, regardless of what the program sources are, and it is not significantly more difficult to achieve by including high-quality purchased software.

Since the MIS manager's responsibility is to make the best use of resources, the most effective techniques should be used for in-house software work. These include prototyping, high-level source languages and applications development systems.

### Real-world situation

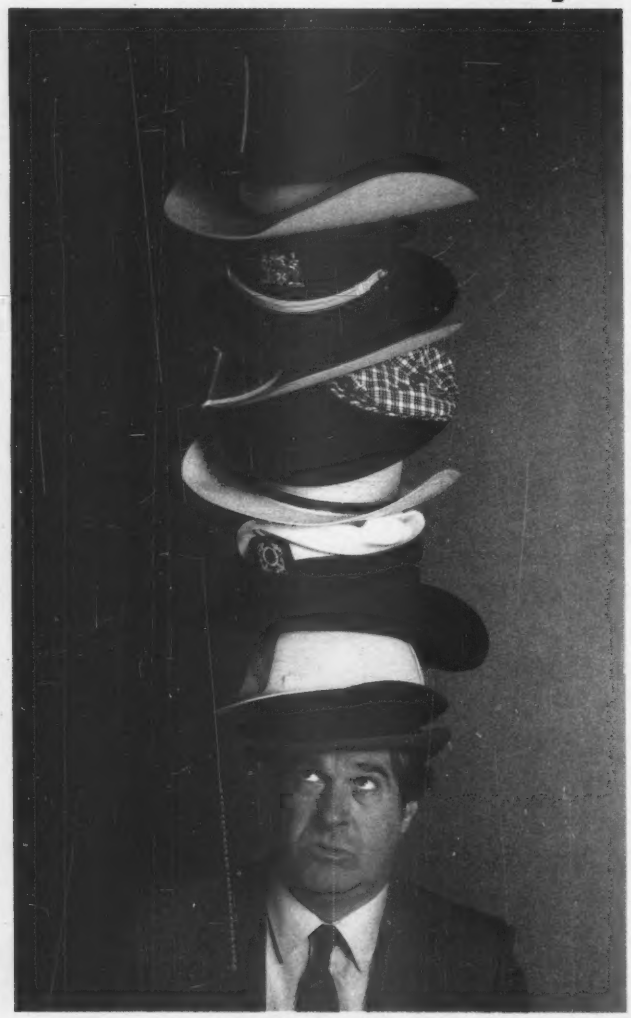
We can now adapt this policy to the more common situation in which our initial assumptions — fully qualified staff, all needed skills, adequate resources, full freedom to make or buy and some but not all company-specific software requirements — do not hold. The goal is still to maximize results for expenditure of resources.

Although the best qualified personnel are the best buy in manpower, this choice is not always open. Whatever the mix of skills and competence, the staff is an important asset. Given good supervision and realistic assignments, staff members can produce good work. It is essential to assess members' skills and capacities realistically and to undertake an application development project only where it has a good chance of successfully producing a quality product in a reasonable time.

A company with many company-specific software requirements definitely can expect difficulty in finding suitable packaged software. A "generalized" software package that is not really flexible enough to be useful in a particular environment is frequently a bad buy.

The package looks good enough before, and for some time after, the purchase. Both the vendor and the purchaser are anxious to make

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the tool work.

Only after the investment of considerable time and effort does it become clear that the package is not going to do the trick.

By that time most of that investment, and often the purchase price as well, are not retrievable. This is probably the biggest risk in buying application software packages.

Careful assessment of the corporate needs and the candidate packages is required to avoid all sorts of difficulties.

> ***The need to make optimal use of limited resources is the best argument for freedom to make or buy.***

### Facing the backlog

What is the best use of limited applications development resources and a restricted software purchasing budget in the face of a large backlog of application creation, some of it highly specialized?

The answer is increased selectivity in the application of resources. In a constrained situation, purchasing programs is more attractive than in the ideal case; a limited budget requires an even more careful choice.

Avoid in-house development of any applications package for which a good buy is available. Some program integration and interfacing can be sacrificed.

This does increase user visibility of individual programs, which again raises the importance of carefully choosing packages to purchase.

In-house development should be aimed at meeting the most important special-purpose needs.

### Best buys

Some of the best buys in purchased programs are small programs, particularly those that perform utility functions. It is easy to lose a lot of effort in the development of handy little programs.

Any one of them ought not to take much time to develop, so manager or supervisor approval is not required. But the time spent is "borrowed" from other projects, and several overruns on different projects can add up to a lot of working hours.

Small expenditures on flexible high-quality programs can often stem the uncontrolled use of resources in this way. On the other hand, buying larger programs provides greater development time and cost saving.

The important criteria are quality, applicability or usefulness and usability.

### The freedom to make or buy

In summary, the need to make optimal use of limited resources is the best argument for freedom to make or buy. The policy in a particular case must be adapted to comprehend specific circumstances, according to basic criteria:

**Purchase** packages that are clearly cost-effective in the specific environment in which they will be used.

**Applications written in-house** should be those that require special knowledge of user needs and the environment.

The development of **interfaces and extensions** to purchased programs can integrate these programs into the whole library of applications software.

And above all, be aware of the realistic alternatives and the true costs of each. ■

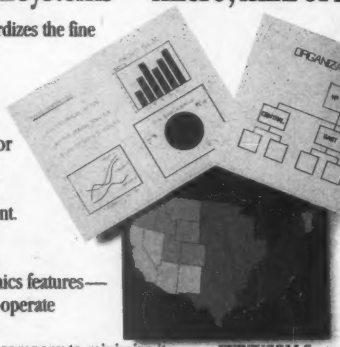

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# NEW PRODUCTS

## Mark William's Let's C out

### Unix-compatible compiler features extensions of C

**Mark William Co. of Chicago has introduced a C language compiler called Let's C.**

**According to a spokesman, Let's C is intended to provide users with an alternative to the two types of C compilers commonly available: professional models and training models.**

The spokesman claimed that the Let's C compiler is a complete implementation of the C language, capable of being used for development of professional software programs.

Features offered by Let's C reportedly include recent extensions to C; inclusion of a standard C library; full Unix compatibility; one-step compiling, linking and assembling; and English language error messages.

Let's C runs on IBM Personal Computers and compatibles with Microsoft Corp. MS-DOS 2 or greater.




**Let's C includes a standard C library.**

The product requires 128K bytes of random-access memory and two disk drives or a hard disk.

Let's C, including a Microemacs full screen editor and source code, is priced at $75.

## Intel DOS Pscope debugging tool creates symbolic test environment

Intel Corp. of Hillsboro, Ore., has announced DOS Pscope, a language symbolic debugger that runs on IBM Personal Computer XTs, ATs and compatibles running Microsoft Corp. MS-DOS 3 or higher.

DOS Pscope is a software debugging tool said to allow users to observe program execution at the source code level by using high-level procedure and variable names and labels.

According to the vendor, it provides software engineers with a symbolic test environment for program execution and includes source code display, high-level code patching and a procedural command language.

According to a spokesman, DOS Pscope offers a syntax-driven prompt line.

The ability to see the actual source code during the debugging process ensures that the user is no longer dependent on constant reference to printed listings.

DOS Pscope allows software engineers to step through programs one assembly instruction at a time, one high-level statement at a time or by executing entire procedures in a single step.

Breakpoints and trace points can be set at the source code level to suspend program execution and display or change the value of variables. Once bugs are located, DOS Pscope allows modifications to program algorithms.

DOS Pscope offers a Pascal-like command language said to allow program patches to be created and inserted into the code without the need for editing source code, recompiling and relinking. Often-used command sequences can be grouped into macros to avoid reentering keystrokes.

DOS Pscope costs $995. Two or more debuggers can be purchased for $795 each, the vendor said.

## Adage adds terminal to 6000 line

Adage, Inc. of Billerica, Mass., has added the 6480 terminal to its Adage Series 6000 workstation family.

The 6480 workstation terminal is a multiwindowing graphics product designed for computer-aided design and computer-aided engineering applications. According to the vendor, it can be attached to an IBM mainframe computer — via the Adage channel unit — and up to five other different computers, including Digital Equipment Corp. systems, concurrently.

The terminal is based on the proprietary Adage Ocean Graphics Engine, which is said to provide rapid generation and display of images for graphics applications. The 6480 is compatible with any computer that uses DEC VT100 and VT200, Tektronix, Inc. 4125 protocols or IBM 5080 graphics order codes.

The 6480 makes use of the Adage Window Manager, which is said to allow users to operate up to four overlapping VT220 windows and full screen 4125 and 5080 windows simultaneously. Reportedly, users can move between windows with a single keystroke.

Software packages said to run on the 6480 terminal within an IBM environment include Cadam, Inc.'s Cadam and IPC, Dassault Systems' Catia and Structural Dynamics Research Corp.'s Caeds.

Packages said to run within a DEC environment include PDA Engineering, Inc.'s Patran II, Structural Data Research's I-Deas, MacNeal-Schwendler Corp.'s MSC/Nastran and Manufacturing and Consulting Services, Inc.'s Anvil-4000.

The 6480 workstation terminal comes with four bit planes, 1.2M bytes of system memory and IBM 5080 emulation software. With a 1,024- by 1,024-pixel, 60Hz noninterlaced color monitor and keyboard, prices start at $18,125.

According to a spokesman, the 6480 can be upgraded in the field to an Adage 6580 DEC Microvax II-based workstation, which can include local disk storage of up to 600M bytes.

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## SOFTWARE & SERVICES

### Systems software

**Honeywell, Inc.** has announced **Edit 8**, a full screen editor for its large-scale computer systems.

Designed to run on the DPS 8, DPS 88 and DPS 90 mainframes, Edit 8 works in a time-sharing mode to provide full text and program editing through screen manipulation.

A spokeswoman said the editor allows users to modify programs, data files and text structures and can be used with Honeywell VIP and IBM 3270-type terminals.

The editor supports microcomputer-to-mainframe links, including Honeywell's PC7800 software for micros under Microsoft Corp.'s MS-DOS.

Edit 8 has a one-time fee of $7,000 or a monthly fee of $275.

Honeywell, P.O. Box 8000, 13430 N. Black Canyon Highway, Pheonix, Ariz. 85005.

■

**Phase Linear Systems, Inc.** has announced an enhanced version of its **PLsort VMX** VM/CMS Sort/Merge system for IBM mainframes.

Version 86.1 is said to offer performance increases over previous releases. Enhanced performance specifications include a decrease by a factor of two in start I/Os. This version is also said to guarantee compatibility and increased performance for VM-compatible software packages, including Pansophic Systems, Inc.'s Easytrieve, Cullinet Software, Inc.'s DMS and tools from SAS Institute, Inc.

PLsort VMX Version 86.1 costs $3,000 per year for a three-year period.

Phase Linear Systems, 1850 K St., International Sq., Washington, D.C. 20006.

■

**Softworks, Inc.** has announced an enhanced version of **VSAM I/O Plus** for DOS/VSE users.

According to a spokesman, VSAM I/O Plus reduces I/O operations, CPU time and elapsed time for jobs processing VSAM files. Job control language changes are required only for fine-tuning of special jobs.

VSAM I/O Plus also features functions to check available GETVIS and to avoid overallocating buffers.

VSAM I/O Plus operates with all DOS/VSE systems. A site license costs $5,995.

Softworks, 7700 Old Branch Ave., Clinton, Md. 20735.

■

**Software Results Corp.** has introduced **Sendplus** software, an extension of its Comboard product line for Digital Equipment Corp. Vaxcluster and remote Decnet users.

Sendplus allows users to share a Comboard interconnect from any VAX in a Vaxcluster or from any remote node using Decnet. With Sendplus installed on each node of a Vaxcluster or Decnet network, all users can get DEC-to-IBM communications through one Comboard.

Sendplus is available for the IBM 3780, Houston Automatic Spooling Program and Systems Network Architecture RJE protocols. It runs on all VAX/VMS systems.

Sendplus costs $1,125, plus $325 for each VAX. If purchased with Comboard, it costs $950 plus $50 for each VAX.

Software Results, 2887 Silver Drive, Columbus, Ohio 43211.

■

**Datametrics Systems Corp.** has released **Version 2** of its **Torch/PMS Performance Management System**.

Torch/PMS is said to allow users to control performance and measure the capacity of Sperry Corp. 1100 computer systems. It produces a series of management and technical reports describing the performance of the system, pinpointing problem areas and highlighting trends of system use.

The package includes a reference manual, a handbook and on-site training. It costs $29,700, the vendor said.

Datametrics, 9840 Main St., Fairfax, Va. 22031.

■

**SPS Software Products & Services, Inc.** has enhanced its **Epos Engineering and Software Development Environment**.

Enhancements include the ability to generate Gantt, Pert and milestone charts automatically in addition to the text and graphical project control functions previously available, the vendor said.

The Epos system is said to be language and machine independent.

Prices start at $37,000.

SPS Software Products & Services, 14 E. 38th St., 14th Floor, New York, N.Y. 10016.

### Application packages

**Global Business Systems, Inc.** has announced its **Tracking Reporting Inventory Pricing System (TRIPS)** for the Prime Computer, Inc. 50 series supermini computers.

TRIPS is a management system for the control of internal telephone equipment written in a fourth-generation language within a relational data base environment.

According to the vendor, it was designed to manage inventory of network facilities, voice/data communications equipment, tracking of service order requests and expenses.

Prices range from $50,000 to $150,000.

Global Business Systems, #200, 4800 S.W. Macadam Ave., Portland, Ore. 97201.


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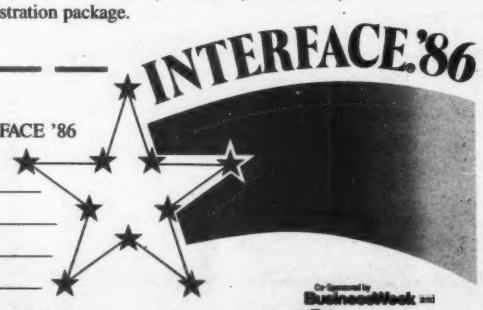
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**Sotas, Inc.** has announced a **Payroll and Human Resources** system designed for Wang Laboratories, Inc. VS users.

The Payroll module allows users to process payrolls of any size or complexity.

The Payroll module calculates and provides reports on all tax elements and will handle up to 40 discretionary deductions per employee, according to the company.

The Human Resources module enables the user to maintain records on all elements of human resources management, Sotas said.

The number and type of records maintained are said to differ by employee.

The modules are available together or as a stand-alone, priced from $10,000, the vendor said.

Sotas, 192 Merrimack St., Haverhill, Mass. 01830.

■

**Ficor, Inc.** has announced **Autograph**, a Unix, C-based graphics package said to convert data base files, directly entered data and spreadsheets automatically into 25 different charts and graphs.

File conversion is automatic. All the graphics formats except the text chart share the same data format, the company said.

The program includes a full screen editor and on-line help.

Autograph comes with three interfaces: ASCII file, direct entry and electronic spreadsheet.

The product may be used on any Unix-based system with an ordinary character terminal — monochrome or color.

Autograph costs $395 to $995, depending on system size, according to Ficor.

Ficor, 10250 Chester Road, Cincinnati, Ohio 45215.

## Languages

**Rapitech Systems, Inc.** has released **Version 4** of its **Fortrix-C series,** said to allow Digital Equipment Corp. VAX users to translate most DEC Fortran VMS programs into C language automatically.

According to a spokesman, the VMS version of Fortrix-C will translate a typical 50,000-line program into C code in a maximum of two weeks with all comment lines remaining in place.

Reportedly, the generated C code is fully structured and the converted C programs run an average of 15% to 30% faster than the Fortran originals.

Fortrix-C was created for use with the Unix system, according to Rapitech Systems.

Release 4 is available for $6,000 per copy.

Rapitech Systems, 75 Montebello Road, Suffern, N.Y. 10901

■

**California Software Products, Inc.** has announced **Baby/38 SEU**, a software package said to allow programmers to write and edit RPG-III source code for the IBM System/38 on an IBM-compatible personal computer.

Baby/38 SEU emulates the System/38 Source Entry Utility (SEU) to provide full screen editing, according to the vendor. All source code entries are automatically checked for RPG-III syntax.

Baby/38 SEU also automatically backs up files in memory, California Software said. Files may be transferred from the host to the personal computer without exiting Baby/38 SEU.

Baby/38 SEU costs $1,995, the company said.

California Software Products, 525 N. Cabrillo Park Drive, Santa Ana, Calif. 92701.

■

**Lattice Inc.** has released **Version 3** of its **Lattice C Compiler.**

New features include void, enum, unsigned as a modifier and function prototype checking. According to the vendor, it also offers more efficient code generation, support for the 80186/80286 instruction set and the ability to generate in-line 8087/80287 instructions.

Version 3 library contains more than 325 functions providing compatibility with Unix, Microsoft Corp.'s Xenix and ANSI, as well as support for Microsoft's MS-DOS Versions 2 and 3.

Version 3 costs $500. Users of Lattice C Compiler Version 2.15 can upgrade for $45.

Lattice, P.O. Box 3072, Glen Ellyn, Ill. 60138.

■

**Subject, Wills and Co.** has released the **Fast Programming** development system, a C programming language generator tool for business application developers.

Fast Programming includes a B+ tree index facility, a field-independent record management system, a complete set of runtime utilities, a library of C routines and several C program generators.

Fast Programming is available for IBM PC-DOS and Microsoft Corp. Xenix on the IBM Personal Computer AT and AT&T Unix V on the AT&T 3B2/3B5.

The product costs $995.

Subject Wills, 800 Enterprise Drive, Oakbrook, Ill. 60521.

## Utilities

**Computer Applications Services, Inc.** has introduced three CICS-based software products, **Gate-Way**, **EMS-I** and **CICS-Abend-Catcher**.

Gate-Way is a link from EMS-I or II to Tymnet/McDonnell Douglas Network Systems Co.'s Tymnet. EMS-I, an electronic mail system, is a subset

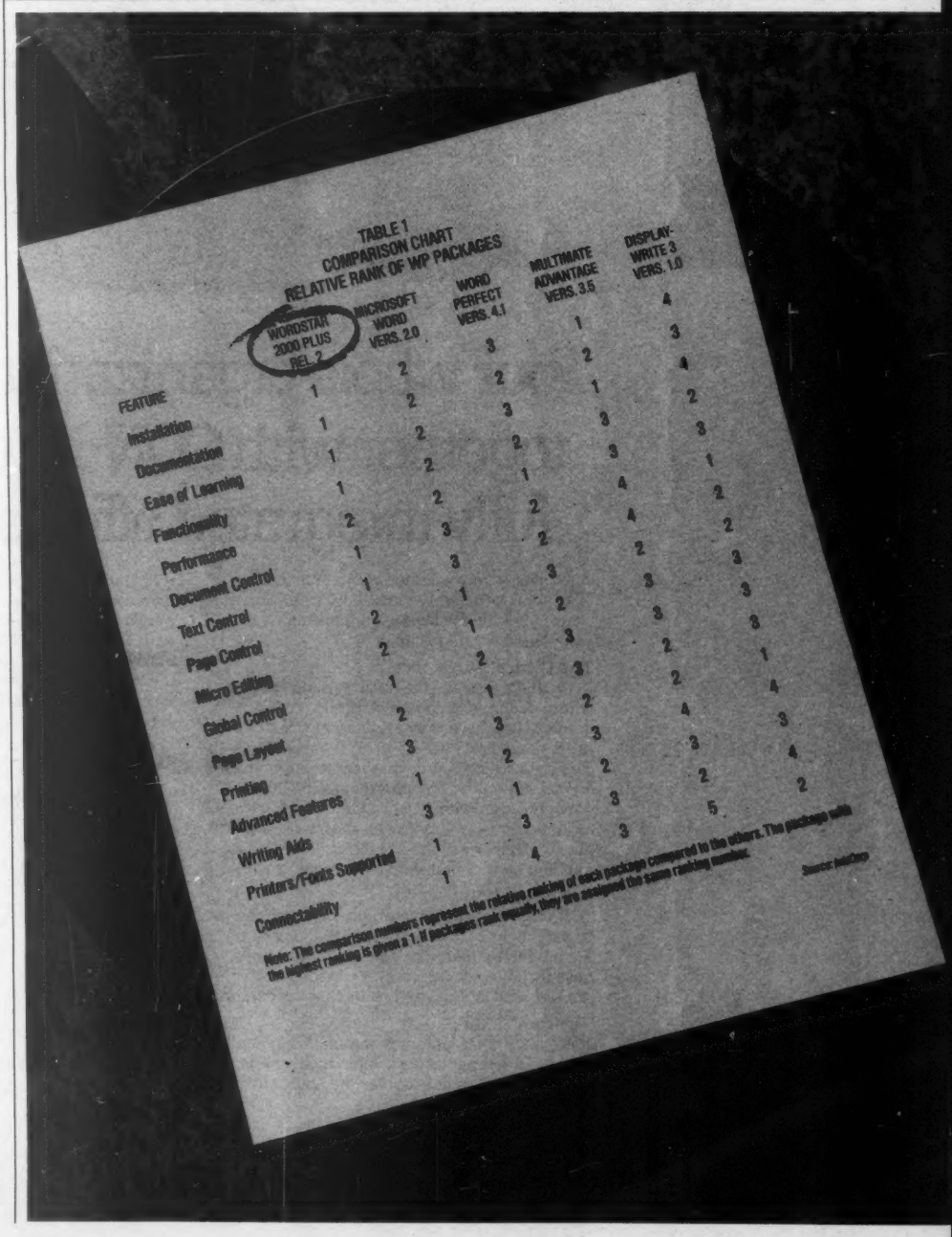


TABLE 1
COMPARISON CHART
RELATIVE RANK OF WP PACKAGES

| FEATURE | WORDSTAR 2000 PLUS REL. 2 | MICROSOFT WORD VERS. 2.0 | WORD PERFECT VERS. 4.1 | MULTIMATE ADVANTAGE VERS. 3.5 | DISPLAY-WRITE 3 VERS. 1.0 |
|---|---|---|---|---|---|
| Installation | 1 | 2 | 3 | 1 | 4 |
| Documentation | 1 | 2 | 2 | 2 | 3 |
| Ease of Learning | 1 | 2 | 3 | 1 | 4 |
| Functionality | 2 | 3 | 2 | 3 | 3 |
| Performance | 1 | 3 | 1 | 4 | 1 |
| Document Control | 1 | 3 | 2 | 2 | 2 |
| Text Control | 2 | 1 | 3 | 3 | 3 |
| Page Control | 2 | 1 | 2 | 3 | 3 |
| Micro Editing | 1 | 2 | 3 | 2 | 1 |
| Global Control | 2 | 1 | 2 | 2 | 4 |
| Page Layout | 3 | 3 | 3 | 4 | 3 |
| Printing | 1 | 2 | 2 | 3 | 4 |
| Advanced Features | 3 | 1 | 3 | 2 | 2 |
| Writing Aids | 1 | 3 | 4 | 3 | 5 |
| Printers/Fonts Supported | 1 | 4 | 1 | 3 | 2 |
| Connectability | 1 | 3 | 4 | 3 | 2 |

Note: The comparison numbers represent the relative ranking of each package compared to the others. The package with the highest ranking is given a 1. If packages rank equally, they are assigned the same ranking number.

Source: Author

of the EMS-II system. It contains a full screen editor, unlimited number of mailboxes, registered mail, route lists and exits for extracting information from data files to create messages. CICS-Abend-Catcher is a real-time, on-line abend tracking and resolution system.

Gate-Way costs $3,995. EMS-I costs $2,995 for DOS systems and $3,995 for OS systems. CICS-Abend-Catcher costs $3,995 for OS systems and $3,495 for DOS systems.

Computer Applications Services, Suite G, 1111 S. Harbor Blvd., La Habra, Calif. 90631.

■

**Interactive Solutions, Inc.** has announced that its **ADS** testing and debugging tool now supports IBM's CICS Release 1.7.

ADS allows CICS users to monitor applications for detection of errors one instruction cycle before they occur. A programmer can probe for application problems, diagnose the causes and dynamically modify the application to continue testing.

ADS costs $19,900 for an OS CPU perpetual license and $14,900 for DOS.

Interactive Solutions, 53 W. Fort Lee Road, Bogota, N.J. 07603.

■

**JMI Software Consultants, Inc.** has announced a **Version 2** of its **Bastoc** software tool, which is said to translate Basic programs into C language.

According to the vendor, Version 2 optimizes the C language output of the translator. It eliminates unreachable code, converts Basic assignment statements into simpler increment or decrement operations in C and evaluates string expressions at compile time. Bastoc can also serve as a Basic compiler.

Bastoc costs $495 for single-user systems.

JMI Software Consultants, Box 481, 904 Sheble Lane, Spring House, Pa. 19477.

■

**Data I/O Corp.** has announced the **Model 201 EPROM Programmer**, an entry-level option for device programming.

The single-socket 201 programs both MOS and CMOS erasable, programmable read-only memories and electrically erasable, programmable read-only memories.

According to the vendor, the 201 contains manufacturer-specified user-upgradable algorithms, RS-232 interface, full editing capability and scrolling menu features.

The programmer performs continuous autocalibration routines.

Model 201 costs $1,150.

Data I/O, P.O. Box 97046, 10525 Willows Road, N.E., Redmond, Wash. 98073.

## Training

**Software Express** has added the **Operator Training Tutorial** to its series of interactive tutorials on Appgen applications.

The Operator Training Tutorial uses a software program and a manual to guide novice end users through procedures such as system logon and logoff, menu selection, data entry procedures and editing shortcuts. The tutorial is self-paced.

The Operator Training Tutorial costs $95 for both the software and the manual and $50 for the manual alone.

Software Express, 2925 Briarpark Drive, Seventh Floor, Houston, Texas 77042.

## Service

**Cincom Systems, Inc.** has announced four classes: **"Management Overview of TIS/XA," "Technical Overview of Supra," "Supra Operations"** and **"Advanced Relational Data Manager."**

Management Overview of TIS/XA is a three-day course presenting an overview of Cincom's TIS/XA information management technologies. It costs $1,150.

"Technical Overview of Supra" is a three-day course presenting an overview of Cincom's Supra relational data base management system. It costs $1,150. "Supra Operations" is a five-day course providing training in Supra. It costs $1,400. "Advanced Relational Data Manager" is a five-day course presenting Supra's advanced relational data manager. It also costs $1,400.

Cincom Systems, 2300 Montana Ave., Cincinnati, Ohio 45211.

# MICROCOMPUTERS

## Systems

**Lodge Electronics** has introduced the **Image Ace II Video Capture System** designed for IBM Personal Computers.

The Image Ace II system allows users to digitize video images from cameras, television tuners and video recorders and display them directly on their computer screens. The system comes with a single-slot circuit card, software on disk, manual and video cable. It produces images with 320- by 200-pixel resolution in four-level black and white or pseudocolor.

The Image Ace II costs $295.

Lodge Electronics, P.O. Box 338, Streamwood, Ill. 60103.

■

**Valid Logic Systems, Inc.** has announced the **Entry Designer AT/EG** and the **Logic Designer AT/EG**, computer-aided engineering systems based on the IBM Personal Computer AT.

The systems include IBM's En-

**Continued on page 80**


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And, after reviewing WordStar 2000 Plus Release 2 alongside MultiMate™ Advantage™ and IBM®'s DisplayWrite® 3, International Data Corporation's Jim Chapman concluded:



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Lotus and IBM DisplayWrite 3 are registered trademarks of Lotus Development Corporation and IBM Corporation, respectively. MultiMate and Advantage are trademarks of MultiMate Corporation. Current WordStar 2000 owners can update to WordStar 2000 Release 2 by calling MicroPro Customer Update: 800-433-0100 x. 265. 9805M 2/86

**Continued from page 79**

hanced Graphics Adapter and 13-in., 640- by 350-pixel Enhanced Color Monitor, an 85M-byte hard disk, optical mouse, 32-bit coprocessor, 2M bytes of random-access memory and AT&T's Unix System V, according to the vendor.

The Entry Designer is said to provide a schematic capture front-end to the Valid Integrated Engineering System.

The Logic Designer is based on the IBM 3270 PC/AT with high-resolution GX graphics display.

The turnkey Entry Designer costs $17,950, and an upgrade costs $7,950. The turnkey Logic Designer costs $22,950, and an upgrade costs $12,950.

Valid Logic Systems, 2820 Orchard Pkwy., San Jose, Calif. 95134.

■

**Vermont Microsystems, Inc.** has announced the **VM-8820 Professional Graphics Kit** computer-aided design package for the Texas Instruments, Inc. Business-Pro computer.

The Professional Graphics Kit includes a 13-in. color monitor with a high resolution of 640 by 480 pixels and the capability to display 256 colors simultaneously from a palette of more than 262,000 colors. It also includes a graphics processor, video cable set, optimized Microsoft Corp. MS-DOS driver, diagnostics disk and technical manuals.

The kit costs $3,990.

Vermont Microsystems, P.O. Box 236, 11 Tigan St., Winooski, Vt. 05404.

■

**Comark, Inc.** has introduced the **Answer**, an IBM-compatible personal computer.

Answer is compatible with Microsoft Corp. MS-DOS and GW Basic.

The product features 640K bytes of random-access memory, 150W power supply, two 5¼-in. floppy drives, a high-resolution Magnovox Advanced Products & Systems Co. transistor-transistor logic monitor, an IBM Personal Computer AT-type keyboard as well as eight expansion slots.

Optional upgrades include a color Magnavox monitor, a Multi Solutions, Inc. I/O card, a smalltalk half card, internal modem, V-20 chips, tape backup systems and hard drives, the vendor said.

The basic Answer model sells for $999.

Comark, P.O. Box 2608, 135 N. Brandon Drive, Glendale Heights, Ill. 60138.

## Software applications packages

**Performance Systems, Inc.** has announced **Pheobe**, a modeling software program, and has ported its **Scert II** performance management tool to the IBM Personal Computer AT/370.

Pheobe is said to allow users to create new models, modify existing models and access prebuilt application models.

It features menu-driven screens, Help screens, user prompts and English commands, Performance Systems said.

The product works in conjunction with Scert.

Pheobe requires and IBM Personal Computer XT, a color graphics display and a printer, according to the vendor.

Scert II costs $49,500. Subsequent copies cost $24,750. Pheobe costs $4,950.

Performance Systems, 30 Courthouse Sq., Rockville, Md. 20850.

■

**Brainpower, Inc.** has announced **Statview 512+**, a statistical analysis package for the 512K-byte Apple Computer, Inc. Macintosh personal computer.

Statview 512+ reportedly includes multivariate analysis techniques; step-wise regression; confidence intervals, standardized beta coefficients and adjusted $R^2$ as well as Durbin-Watson for simple, multiple and polynomial regressions.

The product includes 8-row by 8-column contingency table analysis; user-specified confidence intervals; frequency distributions; and confidence intervals for simple regressions, according to a Brainpower representative.

Statview 512+ also includes data handling features.

The statistical analysis package sells for $349.95.

Brainpower, Suite 250, 24009 Ventura Blvd., Calabasas, Calif. 91302.

■

**Softamatics International, Inc.** has announced the **Software a la Carte** series, a set of business applications in the form of customized packages.

The series of packages includes general accounting as well as industry-specific applications.

The general accounting applications consist of general ledger, accounts payable, accounts receivable, payroll, bank reconciliation and inventory.

The applications also include job cost, order entry, sales analysis, mailing list/sales tracking and purchase order.

The Software a la Carte series is implemented using the Pro-IV application generator from Pro Computer Sciences.

The minimum configuration of the product requires 256K bytes of memory, a hard disk and Microsoft Corp. MS-DOS 2 or higher.

The price of each application is $99.95.

Softamatics International, Suite 201, 16811 El Camino Real, Houston, Texas 77058.


# YOU DON'T HAVE A COBOL PROGRAM SO PATCHED AND TANGLED IT CAN'T BE STRUCTURED AUTOMATICALLY.

Until recently, there were only two ways to deal with the patched-up, hand-me-down, unstructured COBOL programs that consume up to 70 percent of your company's software effort.

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But now there is a third alternative. COBOL structuring. The advantages of this alternative are enormous. Among them, the ability to reduce maintenance costs by 50 percent by more effectively using your programming resources.

The technological leader in COBOL structuring is Language Technology, Inc. In fact, of the very few companies who claim to have a COBOL structuring solution at all, Language Technology is the only one with a system, called RECODER,™ that is fully automatic. The others automate only a portion of the structuring task, leaving the really tough parts to be done manually, over a period of weeks or more, by trained experts, who, because they are human, will make mistakes.

**BENEFITS OF STRUCTURING**

| Source: T. Capers Jones | Unstructured | Completely Structured |
|---|---|---|
| Original program size (lines) | 50,000 | 50,000 |
| New code added (lines) | 3,000 | 3,000 |
| Programmer time (months) | 12.5 | 6.5 |
| Total cost | $75,000 | $39,000 |
| Defects at delivery | 38 | 4 |
| Stabilization period (weeks) | 21 | 2 |
| Meantime to failure (hours) | 1.5 | 28 |

**The benefits of structuring are illustrated in this example, representing the costs of adding 3000 lines of new code to an unstructured program of 50,000 lines, as compared to adding the same number of lines to the same size structured program.**

Based on proprietary language processing techniques and pioneering research in graph theory, RECODER has reduced the tremendously complex mathematics involved to a provably correct solution so complete that it does not force you to accept its own style of structured code. You can select the level of nesting, type of operators, complexity of expressions, formatting style, representation of procedures, and many other features that might be required by your own in-house standards.

RECODER, available as a service or by license, can automatically structure thousands of lines of COBOL in minutes, without the necessity of adding

## NEW PRODUCTS/MICROCOMPUTERS

**Infotech Corp.** has announced the **PC Decision Support Software Series** of personal computer software applications.

According to the vendor, the series was designed to aid in developing and analyzing strategic plans. The applications run in Lotus Development Corp.'s 1-2-3 software program on an IBM Personal Computer.

The first application available is the Strategic Market Planning (SMP) Model designed to analyze the impacts of macro economic activity and marketing strategies on the future performance of a business. Two versions are available: the performance analyzer and the simulation model.

The SMP Business Performance Analyzer costs $149. The SMP Simulation Model costs $249.

Infotech, P.O. Box 576, Sudbury, Mass. 01776.

**P-Cube Corp.** has announced **Mansys/Irm**, a knowledge-based software package said to enable an information services department to measure the quality of its procedures and processes.

Mansys/Irm profiles the components of an information resource management system in terms of comprehensiveness, effectiveness, scope of application, compliance, maintainability and operability.

The product assesses the management system as well as each component part.

Mansys/Irm runs on IBM and compatible personal computers with a minimum of 512K bytes of random-access memory.

A site license for Mansys/Irm sells for $1,800.

P-Cube, 915 Kings Canyon Road, Brea, Calif. 92621.

**Omnisoft Technologies** has announced **Retail Manager**, a point-of-sale and inventory control software package for local-area networks using the IBM Personal Computer, Personal Computer XT, AT and compatibles.

According to the vendor, the package was designed to accommodate up to 32 networked sales registers.

Registers are reportedly linked for automatic price lookup and to update central inventory records and transaction master files.

Features include printed precalculated cash drawer reconciliation and VIP check cashing privileges, the vendor said.

Prices for Retail Manager Systems start at about $7,000.

Omnisoft Technologies, Suite 515, 220 Redwood Highway, Mill Valley, Calif. 94941.

**Micro Education Corp. of America** has introduced **Managing the Market**, a stock price update package for the IBM Personal Computer.

Managing the Market is said to access automatically the Dow Jones News/Retrieval Service as well as other Dow Jones services, and it allows users to update securities prices by phone. It can be used in conjunction with Managing Your Money or stand-alone with spreadsheets such as Lotus Development Corp.'s 1-2-3.

Features include an on-screen stopwatch and the ability to store data for later use.

The program costs $149.95, including a password for the Dow Jones services and an hour of connect time.

Micro Education, 285 Riverside Ave., Westport, Conn. 06880.

■

**Personnel Data Systems, Inc.** has added the ability to perform Social Security benefit projections to its **Personnel Assistant** software system.

The enhancement allows users to display or produce hard-copy benefits statements for single employees or groups of employees showing projected Social Security benefits for normal and early retirement dates.

The Personnel Assistant runs on the IBM Personal Computer XT, AT and compatibles. It requires 512K bytes of memory and a 10M-byte hard disk. It costs $6,000.

Personnel Data Systems, Meetinghouse Business Center, 2240 Butler Pike, Plymouth Meeting, Pa. 19462.

■

**Micromain Systems, Inc.** has announced **Basic Business System**, an application designed to run on the IBM Personal Computer and compatibles in either a single-user or multiuser environment.

Features of the program include accounts receivable, accounts payable, general ledger, inventory control and order entry. The system runs under Cosmos Computer Corp.'s Revelation and uses a bump disk to add more users.

Additional templates for specific modifications such as job costing, expanded inventory control and word processing are available.

A single-user system costs $1,895. A multiuser system costs $2,495.

Micromain Systems, Suite 4100, 33 W. Higgins, S. Barrington, Ill. 60010.

■

**Visual Data Enterprises** has announced **MCAD** a three-dimensional computer-aided design and drafting system for use with the Apple Computer, Inc. Macintosh.

MCAD offers the ability to effect 3-D design with up to 16 simultaneous multiple views and selective rotations of the perspective view.

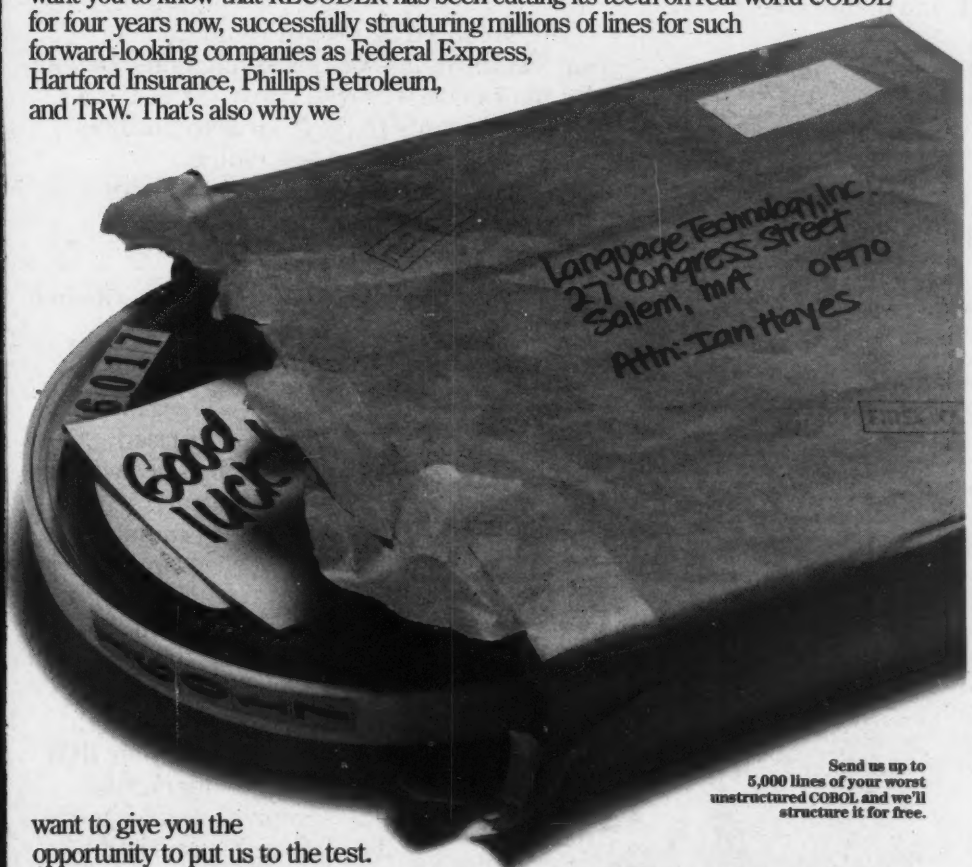
It allows the creation of wire frame designs using geometric tools or surface design using splines and patches. Information can be entered in plan view or from template libraries. Views can be displayed via the Apple Computer Systems, Inc. Laserwriter and Imagewriter II or reformatted for use with Macintosh desktop applications.

MCAD costs $1,995.

Visual Data Enterprises, P.O. Box 1674, West Covina, Calif. 91793.

consultants or any new people to your staff or of requiring any new skills of the people already on it. And, RECODER can do it with a cost effectiveness that will allow it to pay for itself within a year.

Because you hear a lot of promises from a lot of software companies, we can understand if you are skeptical about what we say we can do. That's why we want you to know that RECODER has been cutting its teeth on real world COBOL for four years now, successfully structuring millions of lines for such forward-looking companies as Federal Express, Hartford Insurance, Phillips Petroleum, and TRW. That's also why we




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To find out how, call us today at 1-800-RECODER or (617) 741-1507 or write Language Technology, Inc., 27 Congress Street, Salem, MA 01970.

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# If you need easy access to your IBM mainframe, our Emulation Adapters are just the tickets.

With the IBM Enhanced 5250 Emulation Adapter or the IBM 3278/79 Emulation Adapter, you can quickly convert your IBM Personal Computer into an online terminal. Thereby gaining easy access to mainframe data without leaving your desk. And making the transfer of data between PC and mainframe simple.

What's more, you can access programs at the host and run PC programs simultaneously. Switching from one to the other with a simple keystroke sequence.

You can even pick your own printer in most cases: the host's high-speed printer or your own PC's printer.

**Put the power of our most popular mainframes on your desk.**

The enhanced 5250 emulation card allows you to access the IBM System/34, 36 or 38 with your PC, PC XT, PC AT or *Portable* PC. (Remote access is available on the System /36 and 38 using appropriate hardware and software.)

And the 3278/79 card lets you and your IBM PC, PC XT or PC AT interact with the IBM 4300, 3081, 3083 or 3090, either local or remote.

**You'll thank us for the memory.**

The 3278/79 card's emulation control program requires only 23K of memory.

Which means, with our 3278/79 card, you've got more memory left for application programs. And less tied up with housekeeping functions.

**The key to keyboard familiarity.**

The enhanced 5250 card's emulation program lets you define keyboard functions. Default definitions make it easy to map the PC, PC XT, PC AT or *Portable* PC keyboards to the 5291 keyboard. You can also define your own personal keyboard layout and play back predefined strings of keys.




**The 3278/79 Emulation Adapter is now available through your dealer.**

The 5250 card is carried by selected dealers. Both Emulation Adapters are available at IBM Product Centers and through your IBM marketing representative. You'll be pleasantly surprised by the cost of either card.

So if you'd like to put the power of your company's mainframe to work for you, put in one of our Emulation Adapters. And you'll find out why our cards are the hottest tickets in town.

IBM

## NEW PRODUCTS/MICROCOMPUTERS

**Esselte Pendaflex Corp.** has introduced **Oxford Mailworks**, a software kit designed to help produce and organize IBM Personal Computer-generated mailing lists and labels.

The kit can be used to create labels on a variety of forms. It sorts by name, ZIP code and a user-defined code. All labels are automatically date-stamped. Up to 1,500 addresses can be stored on a 5¼-in. diskette and up to 32,000 addresses on a hard disk.

The program was designed for use with the IBM Personal Computer, Personal Computer XT, AT and compatibles.

Oxford Mailworks, including 500 continuous mailing labels, costs $49.95.

Esselte Pendaflex, Clinton Road, Garden City, N.Y. 11530.

■

**Communications Analysis Corp.** has released **Pulse**, a software telephone accounting system that runs on the IBM family of Personal Computers.

Pulse was reportedly designed for companies that bill back clients for telephone expenses. It accounts for all telephone activity according to the categories of employee, department, division and project.

The product generates both custom and standard reports.

Pulse supports all major private branch exchanges that output call records via an RS-232 interface.

Pulse is available under Microsoft Corp. MS-DOS for $1,995.

An enhanced version, containing city and state descriptions, costs $2,495.

Communications Analysis, 100 Fountain St., Framingham, Mass. 01701.

### Software languages

**Step Engineering** has introduced the **Metastep Language System**, a macro metaassembler.

Metastep is said to be a complete flexible high-order language system with quality diagnostics,

It reportedly permits an engineer doing high-speed bit-slice, bipolar, custom or semicustom microprogrammed design to define architecture and instruction set in simple, readable, C-like syntax.

The product is composed of three parts: the Definition Processor, the Assembler and the Linker, according to the vendor.

Metastep costs $3,000 for IBM PC-DOS and Digital Equipment Corp. VAX versions.

Step Engineering, 661 E. Arques Ave., Sunnyvale, Calif. 94086.

**Majic Software Inc.** has announced **Pro-C**, a professional C code generator.

Pro-C is said to step a developer through an application definition and then generate a fully optimized documented C source code program.

The product comes with 0.5M byte of context sensitive on-line Help that can be incorporated into any program. Pro-C also offers a generic record retrieval mechanism that allows the user to interface a generated program with an existing file system.

Pro-C does not require a runtime license and does not have to be resident on the host machine after the generation of a program.

Pro-C costs $195. It supports C compilers by Microsoft Corp., Lattice, Inc., Computer Innovation, Inc. and DeSmet.

Majic Software, Suite C4, 224 S. Salisbury, West Lafayette, Ind. 47906.

**Micromotion** has ported its **Masterforth** implementation of the Forth programming language to Digital Research, Inc.'s CP/M-based 68000 computers.

Masterforth is said to provide a complete programming environment including a Motorola, Inc. 68000 macroassembler and full interface to Digital Research CP/M 86K. The product offers relocatable utilities and transient definitions as well as a string package, screen editor and resident debugger.

Masterforth costs $125.

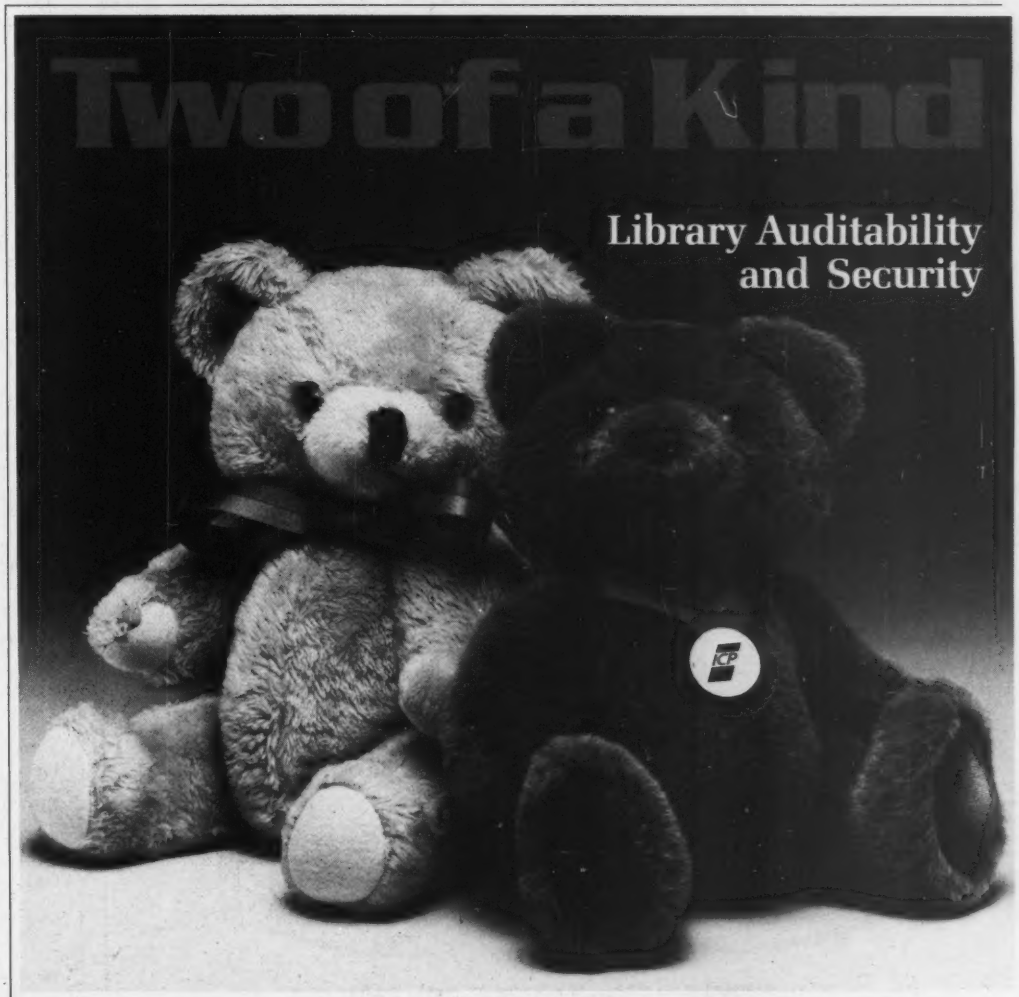
Micromotion, 8726 S. Sepulveda Blvd., #A171, Los Angeles, Calif. 90045.

■

**TDI Software, Inc.** has released **Modula-2** for the Commodore Business Machines, Inc. Amiga.

Modula-2 reportedly offers a full interface to read-only memory kernel, intu-

Continued on page 84


In 1975, Goal Systems created a VSE library management product called FLEE/XP. Ten years later, **FLEE/XP took first place** in the Data Decisions user survey with the highest score ever recorded. Now, with PDSMAN/XP we offer a product that provides MVS users with **the same peace of mind** FLEE/XP has been giving for a decade! One indication of that is PDSMAN/XP's recent reception of an ICP Million Dollar Award.

Attain the confidence of complete audit control over program development, and total security for program access . . . **at the member level** (PDSMAN/XP can be used with popular batch security products). PDSMAN/XP also **reduces library compressions** with a library space reuse facility. And best of all, PDSMAN/XP is from Goal Systems, the library management experts! So if you're an MVS user, or in the process of converting to MVS, try PDSMAN/XP.

FLEE/XP and PDSMAN/XP. Two of a kind from Goal Systems.

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Continued from page 83

ition and Amigados; 32-bit native code implementation with no code or data limitations; all Modula-2 standard modules; transcendental function and real number support and separate compilation of modules with version control.

The product also offers Code statement for in-line assembly code and the ability to locate errors in source code.

The regular version of Modula-2 costs $89.95.

The developer's version, including definition module sources, a symbol file decoder, link and load file disassemblers, a source file cross-referencer, the kermit file transfer utility and source code to some Amiga modules, sells for $149.95.

TDI Software, 10410 Markison Road, Dallas, Texas 75238.

## Software utilities

**White Sciences, Inc.** has announced **Icon Builder**, a graphics software program.

Icon Builder is said to provide a template editor for defining arbitrary rectangular regions on a digitizer tablet surface. It allows the generation of graphics images that may be printed, overlayed on a digitizing tablet surface and used to augment the keyboard space in the construction of Icon-oriented user interfaces to applications programs.

It is made up of four software modules: the Graphics Program, the Template Editor, the Template Install Program and the Overlay Print Program. The Icon Builder costs $79.95.

White Sciences, P.O. Box 24756, Tempe, Ariz. 85282.

**Vertical Solutions, Inc.** has announced **Importer**, a product designed to move information from ASCII text files into Software Publishing Corp.'s PFS:File.

Importer allows data from sources such as spreadsheets, word processors, mainframes and remote computing services to be imported.

Importer runs on IBM Personal Computers. It costs $140.

Vertical Solutions, P.O. Box 5051, Evanston, Ill. 60204.

■

**The MCS Group** has announced the **Word Doctor**, a series of conversion programs designed to convert non-Wang Laboratories, Inc.-compatible word processing documents into the Wang Professional Computer WP format or vice versa.

The Word Doctor is said to convert all word processing features including format lines, margins, tabs and special attributes. Once converted, the documents can be uploaded into Wang's VS and OIS systems. There is also an ASCII file version for use with other programs.

The Word Doctor costs $195.

The MCS Group, P.O. Box 1856, Rapid City, S.D. 57709.

■

**Hammer Computer Systems, Inc.** has announced **E-Z-Dos-It Release 3.1**, business software said to permit IBM Personal Computer users to work on up to four programs at the same time.

E-Z-Dos-It Release 3.1 is said to simplify setting up and using applications programs and features increased addressable memory, which is now 1M byte. E-Z-Dos-It was designed for use with IBM PC-DOS 3 and 3.1.

The software costs $79.95. Owners of previous versions can upgrade for $49.95.

Hammer Computer Systems, Suite 250, 900 Larkspur Landing Circle, Larkspur, Calif. 94939.

■

**Sequent Computer Systems, Inc.** has added **PC-Shells** and **PC-GKS** to its Balance Station software for its Balance parallel computer systems.

The collection includes information management and human interface products. PC-Shells provides a window interface from a personal computer to Balance systems. PC-GKS allows a personal computer to be used as a graphics terminal on Balance systems. PC-Shells and PC-GKS cost $1,000 and $1,500, respectively.

Sequent Computer Systems, 15450 S.W. Koll Pkwy., Beaverton, Ore. 97006.

■

**Datamate Co.** has announced **Lincr**, a software package for users of NCR Corp.'s IRX, ITX, IMOS and RM/COS computers.

Lincr is said to allow users to select information from their data files and load it directly into micros running Lotus Develoment Corp.'s 1-2-3 and other Microsoft Corp. MS-DOS programs using IBM Data Interchange Format to import data.

The program consists of the Enquery report writer on the NCR host and Rasmussen and Associates' Anzio terminal emulation software.

Enquery costs $2,500. Anzio costs $600 for the first copy and $200 for each additional copy.

Datamate, Suite 128, 4135 S. 100 East Ave. Tulsa, Okla. 74146.

■

**The Princeton Software Group** has introduced **Failsafe**, a utility for the IBM Personal Computer.

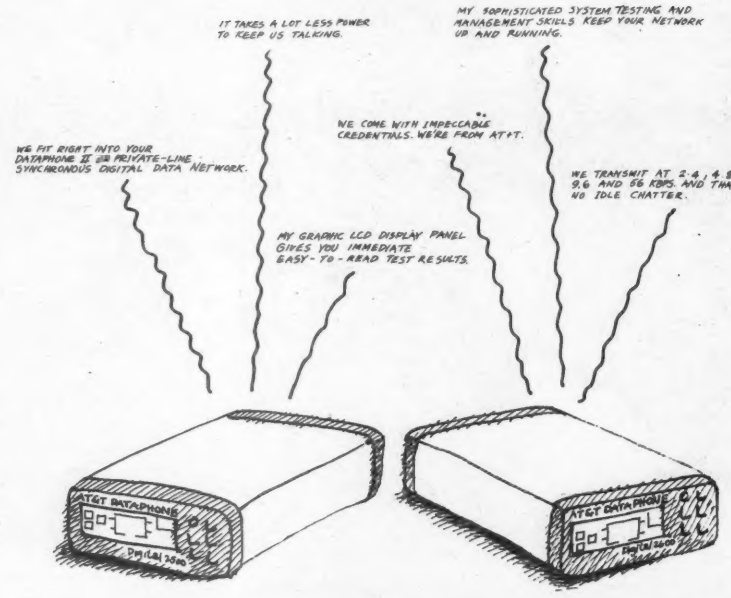
Failsafe is a memory-resident program said to enable users to break any program out of an endless loop, retrieve word processing files lost in random-access memory and examine and edit any location in memory at any time.

Failsafe costs $59.95.

The Princeton Software Group, Suite 283, Building B, 301 North Harrison St., Princeton, N.J. 08540.

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DATAPHONE® II 2500-2600 SERIES DSUs. FROM AT&T. TWO FAST WAYS TO GET MORE FROM YOUR DIGITAL DATA NETWORK.

If you have a digital data network, you need digital service units. But a must-have piece of hardware doesn't have to be something you really get stuck with. The units you choose can make a big difference in how your network performs—and what your operating costs will be.

The DATAPHONE II 2500-2600 Series Digital Service Units are real workhorse units packed with some outstanding features. They provide high-speed transmission and low power consumption to help cut costs—and real-time system testing and monitoring to keep your network running.

The 2500-2600 Series have identical features. But the 2600 connects to our DATAPHONE II Service and offers more advanced network management and control.

Which unit is right for you? That depends on the size of your network and your immediate needs. You can start with the 2500 Series and easily upgrade these units to 2600 when the time comes. You'll never have to discard hardware because it no longer meets your needs.

There is another important reason these DSUs are such a smart investment. They're built and backed by AT&T. They're part of our evolving product line designed to meet your long-term needs.

To order the DATAPHONE II 2500-2600 Series DSUs, contact your AT&T Information Systems Account Executive or your AT&T Supplier. Or call 1 800 247-1212 and learn why these two chatterboxes talk a lot of sense.

AT&T The right choice.

# WHY COPY ON A FLOPPY?



When you store all your files on floppy disks, problems pile up.

First, there's time. You waste lots of it, transferring data. There's space. You sacrifice it to stacks of disks. And then, there's your mind. You lose it trying to find lost floppies.

And if you get sloppy, forget it. A scratch, a cigarette ash or punching the wrong key can cause electronic amnesia, wiping out days of hard work.

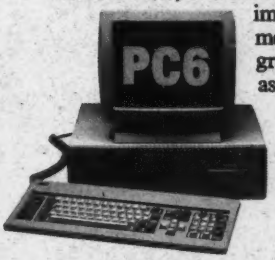
With the new NCR PC6, you're now protected.

The PC6 offers a backup tape drive that insures you against data loss.

It's super fast and super compact.

You can back up a 10MB hard disk in roughly 8 minutes—more than an hour faster than with floppies. And one small tape cartridge stores as much as 27 floppy disks.

What's more, the NCR PC6 runs virtually every important software program. It's megafast, has high resolution graphics, and is designed to grow as you grow.

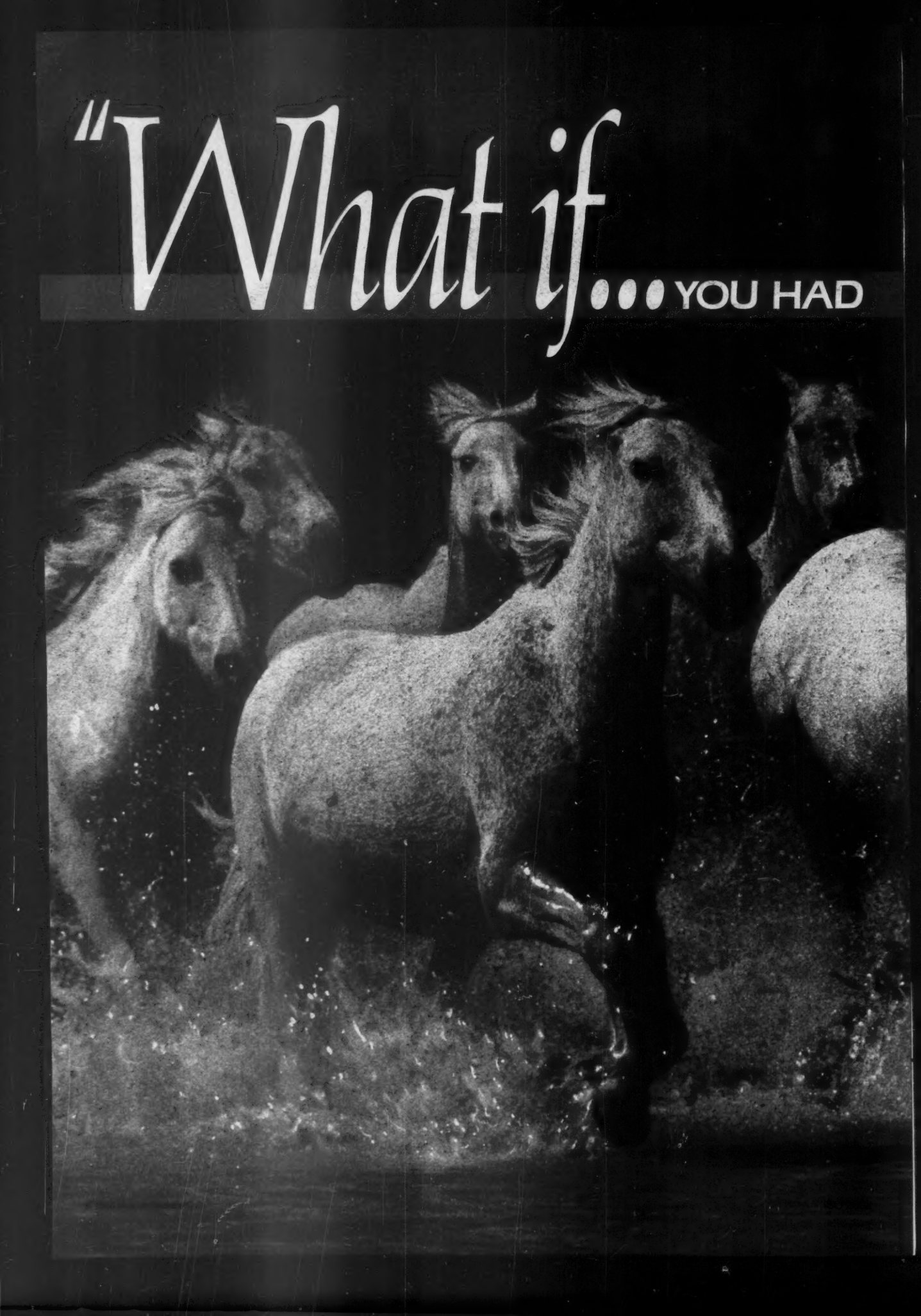



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**A BETTER PERSONAL COMPUTER. IT'S EXACTLY WHAT YOU'D EXPECT FROM NCR.**

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## INTRODUCING THE HP 3000 SERIES 930 SUPERMINI.

The new HP 3000 Series 930 is a new breed of business computer. While it's a full member of the HP 3000 family, it has more brute power and performance than any HP 3000 we've ever built. It's designed around a new breakthrough architecture. But most importantly, it's the latest example of Hewlett-Packard's commitment to providing solutions for the long run.

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The HP 3000 Series 930 gives new meaning to the term "supermini."

Now you can have a 4.5 MIPS computer that can address a space 64,000 times larger than a typical 32-bit machine. A computer that can handle hundreds of on-line users and large batch processing jobs at the same time. In fact, you can link Series 930 systems to create a network for thousands of users.

And with enough power to support a division of a large corporation, the Series 930 is on a performance level with the IBM 4381-12 mainframe. That means you get mainframe-class performance and the ease-of-use of a minicomputer. At a minicomputer price.



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The performance of the HP 3000 Series 930 is achieved through a synergistic use of an enhanced operating system, a new database management system and a new architecture that we call Precision Architecture.

HP Precision Architecture is a fully engineered architecture, based on extensive measurements to evaluate the utility of each feature. We also wanted to keep it simple. The result is a design that exploits the CPU price/performance advantages of R.I.S.C. (Reduced Instruction Set Computing), while adding an unprecedented level of execution balance. A balance that maximizes throughput and efficiency while maintaining compatibility with our current products. In fact, the performance levels have been so dramatic that a new generation of HP computers is being built around HP Precision Architecture.

**THE LONG RUN.**

Since the HP 3000 Series 930 is part of a family, it's compatible with existing HP 3000's. And HP Precision Architecture assures compatibility with the new, more powerful HP computers to come. Because we don't believe in temporary solutions.

We believe in solutions that help your company for the long run. And that takes more than hardware and software. It takes ideas. Ideas that have given us a worldwide reputation for quality products. And the quality service and support to match.

So at Hewlett-Packard, we never stop thinking, questioning, probing. We're always asking... "What if...?"

If this sounds like the solution you've been looking for, call 1 800 345-6366, Dept. 282G for more information.

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*Business Computing Systems*

## NEW PRODUCTS/MICROCOMPUTERS

**M/H Group** has announced **W-Links**, a software product for Wang Laboratories, Inc. and IBM Personal Computers said to provide four disk-to-disk document conversions.

According to the vendor, W-Links converts Wang PC documents to Multimate International Corp. Multimate, IBM Displaywrite I, II and III, Micropro International Corp. Wordstar and Wordperfect formats and vice versa.

Converted documents are said to preserve the ability to edit the original documents.

All formats and word processing codes are converted between the two systems, according to a M/H Group representative.

The price of the W-Links software is $395.

M/H Group, 222 W. Adams, Chicago, Ill. 60606.

**A&T Systems, Inc.** has announced **DMS/The Disk Management System** for IBM Personal Computers and compatibles.

DMS is a disk and file management utility said to allow users to recover lost data, increase system speed and reliability, locate and reorganize information, execute applications using function keys and customize attributes of files and directories.

DMS includes more than 40 disk and file management functions. It costs $99 per copy.

A&T Systems, 12904 Olivine Way, Silver Spring, Md. 20904.

### Software data base management systems

**Versasoft Corp.** has announced **Dbman**, a relational Ashton-Tate Dbase-compatible data base manager for the Atari, Inc. 520ST.

Dbman is said to be programmable, and it supports multiple index files.

Dbman costs $99.95 until July 1. After that, the price will be $149.95.

Versasoft, 723 Seawood Way, San Jose, Calif. 95120.

■

**DHA Systems & Software** has announced **Fastpak Data**, a simplified data base software package.

Fastpak Data is said to allow users to add new fields and files without having to change or reformat the data base. It was designed to work in conjunction with the vendor's Fastpak Mail list management program.

Fastpak Data costs $159. Bundled with Fastpak Mail it costs $199.

DHA Systems & Software, 832 Jury Court, San Jose, Calif. 95112.

### Software enhancements

**Schnapp Software Consulting** has released **Remind 5.4**, a daily reminder utility for the IBM Personal Computer and compatibles.

Remind reportedly maintains a data base of appointment dates and warns the user when any dates are pending and moves past dates into a separate file.

Remind is not memory resident. It requires about 32K bytes of available memory.

The price of Remind 5.4 is $19.95.

Schnapp Software Consulting, P.O. Box 261091, San Diego, Calif. 92126.

■

**Walonick Associates** has unveiled **Statpac Gold**, a version of its statistical analysis package, Statpac.

Statpac Gold is said to accommodate 500 variable and record sizes of 5,000 characters. It uses windows and graphics and may be either menu or command driven. It supports both interactive and batch processing.

Statpac Gold requires a hard disk, medium- or high-resolution graphics board and at least 192K bytes of memory. It costs $595. Current owners of Statpac can upgrade for $150.

Walonick Associates, 6500 Nicollet Ave. S., Minneapolis, Minn. 55423.

■

**PBI Software, Inc.** has introduced **Graphworks 1.3**, an enhanced version of its software program for Apple Computer, Inc. Appleworks users, said to allow creation of graphs directly from spreadsheet data files.

Aceording to the vendor, the version includes the capability to print spreadsheets sideways on continuous form paper, accommodating whole spreadsheets, regardless of how many columns there are.

Graphworks 1.3 requires an Apple IIc or an Apple IIe with 128K bytes of memory. It costs $79.95. Owners of Graphworks 1.2C may upgrade for $5. Owners of earlier versions may upgrade for $15.

PBI Software, 1111 Triton Drive, Foster City, Calif. 94404.

■

**Microplot Co.** has released **PC-Plot-III**, an enhanced version of its graphics emulator software package.

The package is said to enable an IBM Personal Computer or compatible to appear to a mainframe as a Digital Equipment Corp. VT100/VT52, a Retrographics VT640, a Tektronix, Inc. 4010/4014 or a partial 4027.

Enhancements include ASCII file transfer, programmable function keys, autodial from telephone directory, on-line Help and mouse support.

PC-Plot-III costs $95.

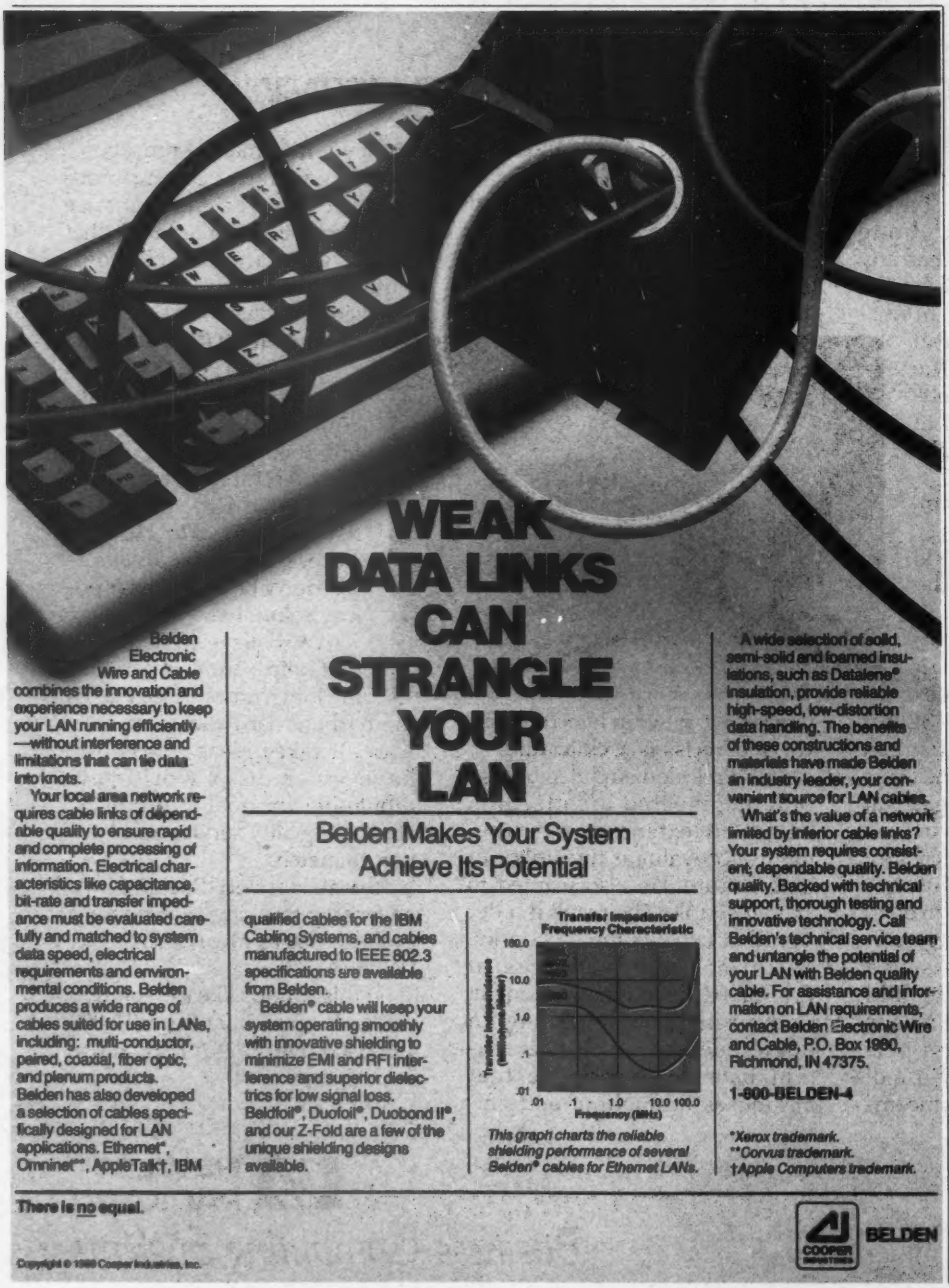
Microplot, 659-H Park Meadow Road, Westerville, Ohio 43081.

■

**Cottage Industries, Inc.** has announced two releases of its **Menu System** for the IBM Personal Computer XT, AT and compatibles.

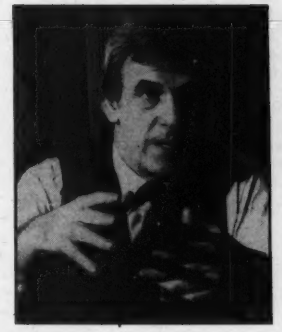
Version 3 of the Menu System is for single-user systems. It features interactive input, which allows users to copy files and execute replaceable parameter Microsoft Corp. MS-DOS commands. It also offers menu in-

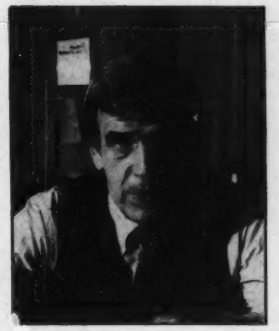
**Continued on page 90**



# "Computerworld's the bible of the industry."

*Dick Leonard*
*Advertising and Sales*
*Promotion Manager*
*Software International*
*Andover, MA*







Software International, a General Electric company and creator of mainframe applications software, has installed more than 5,000 financial software packages. They recently took the lead in calling for industry-wide standards in software development and published a white paper entitled "Setting Standards in Mainframe Applications Software."

Dick Leonard, Advertising and Sales Promotion Manager, wanted to make sure that Software International's white paper reached the entire "computer market." He chose Computerworld. As Dick puts it:

*"Of course, Computerworld. We wouldn't be able to reach as many professionals in the marketplace anywhere else. It's the bible of the industry and has been our primary book for the past two years. And, once again, Computerworld lived up to its reputation."*

Response. *"I would have been delighted with a couple hundred or so responses. But these Computerworld ads produced more than 3000 leads — very surprising by any measure. And they even outpulled our usually very successful direct mail campaign."*

Readership. *"A lot of MIS/DP books are vendors talking to vendors. But it became apparent that* everyone *is reading Computerworld. We received responses from presidents, programmers, consultants, educators, MIS/DP directors — and from every type of industry in the Fortune 1000. Even our software competitors responded."*

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A PUBLICATION OF CW COMMUNICATIONS



**Continued from page 88**

struction line control and escape disable.

Version 4 is for MS-DOS-based multiuser installations. It includes the same features as the single-user version.

Menu System costs $49.95.

Cottage Industries, P.O. Box 176, Liberty, Mo. 64068.

■

**Tatum Labs** has released an enhanced version of its **Electronic Circuit Analysis** (ECA) software package for simulating analog circuits.

ECA 2.2 offers graphics output and Fourier analysis features as well as an improved user manual. The graphics capability is said to facilitate the display of the frequency response, the transient analysis function and the nonlinear transfer characteristics.

ECA 2.2 runs on Microsoft Corp. MS-DOS-based microcomputers. It costs $450.

Tatum Labs, 33 Main St., Newtown, Conn. 06470.

■

**Data Based Solutions, Inc.** has released **Dnames III**, a version of its mailing list management system.

Dnames III does not require Ashton-Tate's Dbase III to run. It has a user-definable classification system, dollar fields and comment fields.

The system's report capabilities include labels printed in any format using a user-defined setup screen. It can print continuous-form Rolodex cards, user-defined field list reports and form letters.

Complete with source code, Dnames III costs $49.

Data Based Solutions, Suite 105, 1975 Fifth Ave., San Diego, Calif. 92101.

■

**O'Hanlon Computer Systems** has enhanced its Sensible Solution data base development language and changed its name to the **Database Solution Version 3**.

The Database Solution is said to offer more programming power, more network support and additional features such as export capability, full terminal color support and hooks for accessing the operating system, peripheral devices and batch files.

O'Hanlon's Database Solution runs on operating systems including Microsoft Corp. MS-DOS, IBM PC-DOS and Digital Research Inc.'s CP/M 80.

It costs $695 for the single-user version and $995 for the multiuser version.

O'Hanlon Computer Systems, Suite 110, 11058 Main St., Belleview, Wash. 98004.

■

**Index Technology Corp.** has released **Version 1.6** of its **Excelerator** software for systems analysis and design and has ported it to Wang Laboratories, Inc. and Texas Instruments, Inc. Professional Computers.

Version 1.6 includes expanded analysis and graphics functionality, a security device and options for text input.

The Wang version operates on the Wang's PC-XC and PC-SC microcomputers. It requires a monochrome monitor, graphics card, Microsoft Corp. serial mouse, 10M-byte hard disk and 640K bytes of memory.

The TI version requires a video display adapter with three-plane graphics adapter, 10M-byte hard disk, 640K-byte memory and a Logitech, Inc. mouse.

Excelerator costs $8,400.

Index Technology, Five Cambridge Center, Cambridge, Mass. 02142.

■

**Aldus Corp.** has announced **Release 1.2** of its **Pagemaker** desktop publishing software program.

Release 1.2 is said to provide full access to seven new typeface families in Apple Computer, Inc.'s Laserwriter Plus printer. It also supports the 12 typeface packages available from Adobe Systems, Inc. that can be downloaded to the Laserwriter or Laserwriter Plus. It also provides user control of tab stops and indents and supports the Dataproducts Corp.'s LZR-2665 printer.

Pagemaker costs $495.

Aldus, 616 First Ave., Seattle, Wash. 98104.

## Communications

**Computer Mail Services, Inc.** has announced **Mailplus**, a software product said to allow MCI Communications Corp. MCI Mail subscribers to enter and exit the system with only two keystrokes.

Mailplus is said to provide built-in security to prevent unauthorized use of an MCI Mail account. It also enables MCI Mail customers to personalize form letters and verify ZIP codes. It remains on-line only as long as required.

Mailplus requires an IBM Personal Computer with 256K bytes of memory, a communications port and a modem. It costs $95.

Computer Mail Services, 17200 W. Ten Mile Road, Southfield, Mich. 48075.

■

**CBIS, Inc.** has introduced **Network-OS 6**, a 16-bit, Netbios-compatible network operating system.

Network-OS is said to support Microsoft Corp. MS-DOS 3.1, all major network topologies and Novell, Inc. file and record locking.

It is a menu-driven system, and local-area network resources are addressed by user-defined object names and mapped by mouse or keyboard.

The product supports four users

**Continued on page 92**





With increasing competition, businesses are beginning to realize the necessity — and urgency — of becoming more productive. This, in turn, calls for greater office automation — and is creating a growing market for computer-related office products.

In May's Computerworld Focus, we deliver that market to you with an issue devoted to solving some of the most pressing office automation issues.

We'll focus on keeping up with new office automation technologies while meeting user demands. And provide experienced user strategies and tips to assist MIS/DP directors in bringing on new technologies without abandoning existing hardware and software.

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If you're in the graphics end of the business, you've got an even bigger reason to be in our May issue. We'll be discussing the latest trends in the market and the hottest technologies available. We'll see how traditional MIS/DP systems can be used for exciting graphics — and which applications are most beneficial. And, we'll help our readers make the right hardware and software decisions for their own special needs.

**Reach the people you want most.**

The people who'll be reading our office automation issue are the people you want most. 129,000 MIS/DP professionals who subscribe to Computerworld. Plus thousands of pass-along readers. Plus attendees at NCGA and NCC.

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May's Computerworld Focus issue on Office Automation.

But hurry, closing is April 4. For more information, contact Ed Marecki, Vice President/Sales, Computerworld Focus, 375 Cochituate Rd., Framingham, MA 01701, (617) 879-0700. Or call your local Computerworld sales representative.

**Issue: May 14 - Closing: April 4**

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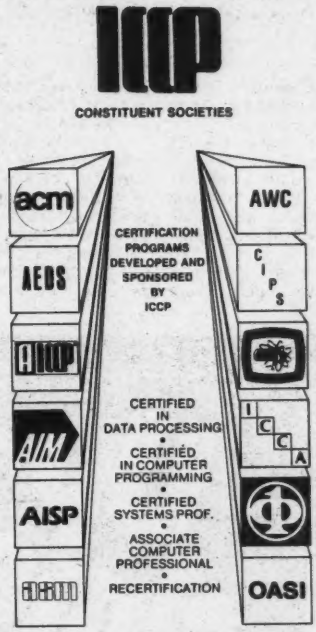
### When Are Exams:

Two examination sittings are held in 1986. There is a May 10, 1986 examination, with application deadline of April 1. There is a November 8, 1986 examination, with application deadline of October 1.

Applications received after the deadline may not be processed. Candidates are cautioned to mail their Application with the appropriate fee well in advance of the deadline date. Use the coupon attached to this advertisement today.

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Complete and send coupon to: ICCP, 2200 East Devon Ave., Suite 268, Des Plaines, IL 60018.

A

Continued from page 90

per IBM Personal Computer XT or 16 users per Personal Computer AT. Multiple servers may be linked together.

Network-OS costs $995. Interface boards cost $295.

CBIS, 2323 Cheshire Bridge Road, Atlanta, Ga. 30324.

■

**BPS Information Services, Inc.** has announced **RCW/3X**, a software product for the IBM Personal Computer and compatibles.

RCW/3X is said to allow authorized personnel access to an IBM System/34, 36 or 38 as a console or local workstation from anywhere in the world.

RCW/3X consists of two software modules, local support and remote access. The local support module is installed on a personal computer attached to the System/34, 36 or 38 via 5250 local emulation.

The RCW/3X license charge is $250 per central location.

BPS Information Services, P.O. Box 1189, Cedar Rapids, Iowa 52406.

■

**Computer Technology Associates, Inc.** has introduced **Teamwork**, an electronic mail package for teams of personal computer users and telecommuters.

Teamwork integrates correspondence management, file exchange and business forms handling using existing personal computers and telephone facilities. It automates mail management functions including mailbox maintenance, address look-up, scheduling of delivery, acknowledgment and reply tracking and logging all incoming and outgoing mail. It operates over the dial-up voice network. A starter package costs $125.

Computer Technology Associates, 5670 S. Syracuse Circle, Englewood, Colo. 80111.

■

**American Video Teleconferencing Corp.** has announced **In-Synch**, a software package designed to allow two users of the IBM Personal Computer, Personal Computer XT and Personal Computer AT or compatibles linked by standard modems over telephone lines to collaborate using business software such as Lotus Development Corp. 1-2-3.

According to the vendor, In-Synch provides a total interactive personal computer conferencing environment. The memory-resident software features keystroke sharing, screen snapshots, circling and highlighting, commenting, slide shows and meeting minutes.

In-Synch costs $149.95.

American Video Teleconferencing, Suite 115, 110 Bi-County Blvd., Farmingdale, N.Y. 11735.

## COMMUNICATIONS

### Voice/data communications

**Black Box Corp.** has announced the **Data Traffic Manager**, an intelligent data private branch exchange.

The Data Traffic Manager is offered in eight- and 16-channel versions. It supports RS-232 and Centronics Data Computer Corp. interfaces and asynchronous communications from any port to any port, any port to all ports and any speed to any speed.

The system has 54K bytes of dynamically allocated random-access memory (RAM) and 24K bytes of nonvolatile RAM.

The eight-port RS-232 costs $2,495. The 16-port RS-232 costs $2,995.

Black Box, P.O. Box 12800, Pittsburgh, Pa. 15241.

### Protocol converters

**Votrax, Inc.** has introduced the **3270 Binary Synchronous Protocol Conversion Module** (3270 Bisync PCM) said to allow the vendor's LVM Business System to simulate a cluster of IBM 3270 display terminals.

The 3270 Bisync PCM communicates with an IBM Mainframe on one side via an RS-232C interface and the LVM or a front-end processor on the other. It is a single printed-circuit board, and it supports 16 telephone lines.

The 3270 Bisync PCM costs $2,246.

Votrax, 1394 Rankin, Troy, Mich. 48083.

### Multiplexers/modems

**Inmac Corp.** has introduced the **Clear Signal 2400 BPS Modem**.

The Clear Signal 2400 offers autoanswer and autodial. It has memory to store up to 10 phone numbers. It has an adjustable data transfer rate of 300, 1,200 or 2,400 bit/sec. and also features adaptive equalization over marginal phone lines.

The modem costs $775. In a card version, containing two modems per card, it costs $995. A rack-mountable modem chassis that holds 16 modem cards costs $850.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

■

**Western Datacom** has added **Microcom MNP Class 4** to its Error Free Modems.

The Microcom MNP protocol can be implemented in software or hardware. The 424 Error Free modem is direct-connect registered and slides into an existing Racal-Vadic, Inc. chassis. It features voice/data applications, manual/automatic operation, originate/answer operation and automatic bit/sec. rate detection.

The 424 Error Free costs $795.

Western Datacom, 5083 Market St., Youngstown, Ohio 44512.




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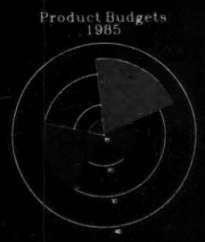
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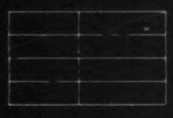
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SPSS Inc., 444 N. Michigan Avenue, Chicago, IL 60611. 312/329-3500.

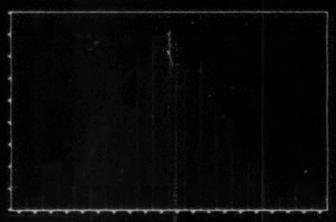
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## NEW PRODUCTS/COMMUNICATIONS

**Case Communications, Inc.** has announced the **DCX 812M** four- or eight-port statistical multiplexer with built-in modem.

The integral modem is a Case Series 4000 with speeds of 9.6K and 14.4K bit/sec.

Trellis encoding is used at 14.4K bit/sec., Case Communications said.

Tests include channel loopbacks, fax message generation, modem loopbacks and error-rate tests, according to the vendor.

Pricing for the 812M models is as follows: the 812M four-port/9.6K bit/sec. model sells for $3,190, the 812M eight-port/9.6K bit/sec. model sells for $3,690, the 812M four-port/14.4K bit/sec. model sells for $4,460 and the 812M eight-port/14.4K bit/sec. model sells for $4,960.

Case Communications, 2120 Industrial Pkwy., Silver Spring, Md. 20904.

**Everex Systems, Inc.** has announced the **Evercom**, a 300/1,200 bit./sec. modem on a half-size card designed to fit the short slots in the IBM Personal Computer XT, Portable and compatibles.

The Evercom is said to be Hayes Microcomputer Products, Inc. compatible. It features call progress monitoring, voice/data communications with automatic transition, audio and data telephone line monitoring, half- and full-duplex data transmission and a built-in loudspeaker under software volume control.

The Evercom modem costs $249.

Everex Systems, 47777 Warm Springs Blvd., Fremont, Calif. 94539.

### Local-area networks

**Penta-Group, Inc.** has released **Version 2** of **Penta-Phone**, its interterminal link for use on Digital Equipment Corp.'s PDP-11 family of computers operating under RSTS/E.

According to the vendor, Penta-Phone allows up to four users to converse with each other on either a parallel or serial basis and displays all conversations on each user's CRT. Features include on-line Help, system management utility for controlling user access and a directory of authorized users.

The package costs $200.

Penta-Group, 1187 Main Ave., Clifton, N.J. 07011.

■

**The Wollongong Group, Inc.** has announced **WIN/UTS**, a networking link between the Amdahl Corp. UTS operating system and other systems running TCP/IP.

Via an Ethernet connection, WIN/UTS allows communications among a variety of dissimilar systems ranging from personal computers to supercomputers.

Capabilities include file transfer, network virtual terminal support and network mail.

WIN/UTS costs $25,000.

The Wollongong Group, 1129 San Antonio Road, Palo Alto, Calif. 94303.

## SYSTEMS & PERIPHERALS

### Processors

**Datachecker/DTS** has announced the **1742 Large Store Controller**.

The 1742 features extra high-speed processing power and high-speed memory, making it possible to process transactions from more than 40 scanning lanes and heavy software applications at the same time.

The 1742 includes a large memory option, two asynchronous communications interfaces and user file back-up as standard equipment.

The 1742 sells for $62,250. The 1730 to 1742 upgrade costs $12,000.

Datachecker/DTS, 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

### CAD/CAM/CAE

**National Instruments** has announced **IEEE-488 support** for the Apollo Computer, Inc. Domain Series 3000 Personal Workstation.

The product makes use of a Gpib-PC interface board operating system software modified for personal work-

Continued on page 96


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Continued from page 94

station use. Applications developed on the older Apollo Domain system can be ported to the new system.

The product is available for $795, including interface card and handler software.

National Instruments, 12109 Technology Blvd., Austin, Texas 78727.

■

**The Complete CADD Co.** has announced its **CADD-PC** and **CADD-AT** workstations.

Each workstation consists of computer-aided design and drafting (CADD) software, an IBM-compatible computer, high-resolution monochrome or color video screen, mouse pointer, printer/plotter and a business software package.

Hard disks, a digitizer tablet, a pen plotter and voice control are all available options.

The CADD-PC is priced at $2,695, and the CADD-AT costs $4,495.

The Complete CADD, Suite 415, 1008 Western, Seattle, Wash. 98104.

■

**Adage, Inc.** has enhanced its **Cadstation 2/50** computer-aided design system, featuring access to a mainframe-resident Cadam, Inc. Cadam data base.

The enhancements include a color subsystem with a 19-in. diagonal, 1,024- by 1,024-pixel, 60Hz noninterlaced display, tilt/swivel monitor base and a light pen.

Other enhancements are 48M- and 86M-byte fixed-disk options, including controller, system memory expansion to 4M bytes and plotter attachments such as a plotter multiplexer and cables.

The base price for the Cadstation 2/50 is $21,900. The color subsystem costs $5,500. The 48M- and 86M-bytes disks cost 5,450 and $6,950, respectively. The memory expansion costs $1,950.

Adage, One Fortune Drive, Billerica, Mass. 01821.

## Graphics systems

**Gould, Inc.**'s Imaging and Graphics Division (IGD) has announced the **Model 4000 Remote Sensing System** for processing remotely sensed, large-scale geographic images.

The Model 4000 integrates the IP8400 image processing system with high-resolution display, Gould's CSD PN6040 Unix-based computing engine and a remote-sensing software package from Erdas of Atlanta.

System functions include image enhancement, multiple-image correlation, image overlay, geometric correction, classification, video digitizing, a polygon digitizing tablet, 4,096-color hard-copy capability, compatibility with Landsat and Spot tape inputs and a software tool kit for program changes in Fortran.

The Model 4000 costs $110,000.

Gould, 46360 Fremont Blvd., Fremont, Calif. 94538.

■

**Adage, Inc.** has added the **3500 System** Digital Equipment Corp. Microvax II-based graphics system to its 3000 System product line.

The 3500 comes with four double-buffered high-resolution image memory boards supporting up to 32-bit planes of pixel data. It also includes a 32-bit bit-slice processor, 1M byte of display list memory, 64K bytes of writable control store microcode memory, 16-bit Z-buffer and a full-color video lookup table.

The 3500 System supports a set of Fortran callable display routines and all software under DEC's MicroVMS operating system.

It is priced from $79,500.

Adage, One Fortune Drive, Billerica, Mass. 01821.

## Auxiliary equipment

**Inmac Corp.** has announced its **A-B Switch** said to enable two users to share a modem, printer or plotter.

The switch also can be used to switch one user instantaneously between two peripherals. It uses a personal computer board construction and is available in serial or parallel versions.

The Inmac A-B Serial Switch costs $95. It features three 25-pin female connectors with all 25 lines switched.

The A-B Parallel Switch costs $139. It features three 36-pin Centronics Data Computer Corp. female connectors with all 36 lines switched.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

■

**Eldon Office Products** has announced the **Combo File With Lock** for safe storage of diskettes, cassettes and data cartridges.

The Combo File is compatible with trailing data tape cartridges, standard cassettes and all 5¼-in. diskettes. It will accommodate up to four cartridges and 35 5¼-in. diskettes. The lock is nonmagnetic.

Combo File With Lock costs $24.98.

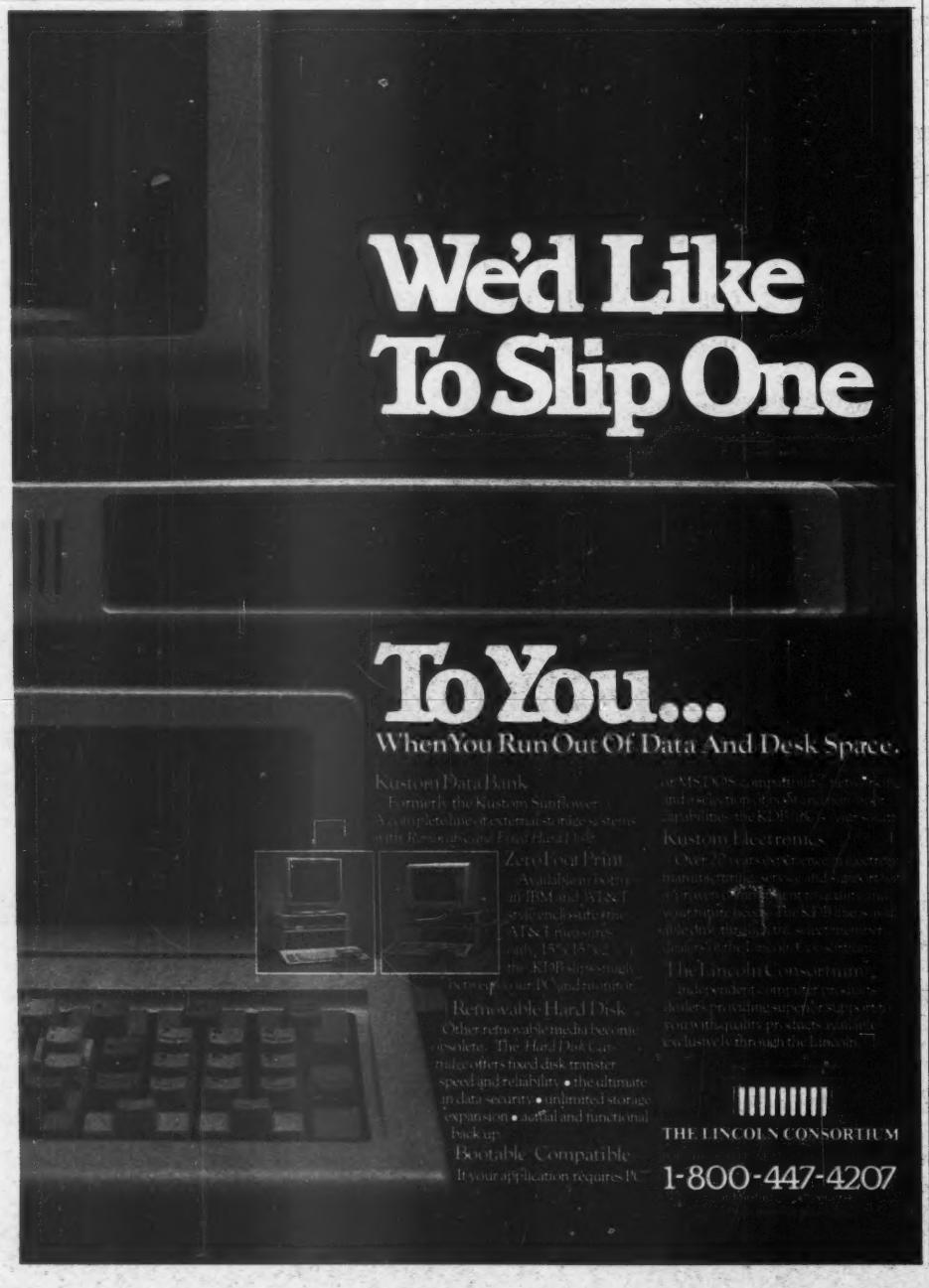
Eldon Office Products, Department SP, 1130 E. 230th St., Carson, Calif. 90745.

## PRICE REDUCTIONS

Zenith Data Systems Corp. has announced a price reduction for its **Z-171, Z-148** and **Z-138** personal computers.

The Z-171 portable now costs $2,399. The Z-148 desktop now costs $1,499. A single-drive version costs $1,299. The Z-138 portable now costs $1,799. Zenith Data Systems has also lowered the price of its daughterboard expansion cards to the Z-148 and Z-138 to $99.

Zenith Data Systems, 1000 Milwaukee Ave., Glenview, Ill. 60025.



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- Information Center Management System
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## CALENDAR

### WEEK OF MARCH 16

MARCH 16-21, PHILADELPHIA — **Management Information Systems for Strategic Advantage.** Contact: Office of Executive Education, The Wharton School, University of Pennsylvania, 200 Vance Hall, Philadelphia, Pa. 19104.

MARCH 17, BOSTON — **Establishing the Executive Workstation.** Contact: Diane Rodgers, DMR Associates, Inc., 57 River St., Wellesley Hills, Mass. 02181.

MARCH 17-18, BUFFALO, N.Y. — **DBMS Software: Functions — Package Comparison.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

MARCH 17-19, HONG KONG — **Conference on Computer Control, Audit & Security in Banking and Finance.** Contact: Conference Chairman, P.O. Box 212, Georgetown, Ont., Canada L7G 4Y5.

MARCH 17-19, ORLANDO, FLA. — **Managing and Motivating for Improved Productivity.** Contact: Marilyn S. Bodek, Data Entry Management Association, P.O. Box 16711, Stamford, Conn. 06905.

MARCH 17-20, SAN FRANCISCO — **Telecommunications Systems in Government.** Contact: Conference Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903. Also being held March 31 to April 3 in Dallas and April 14-17 in Atlanta.

MARCH 17-20, WASHINGTON, D.C.— **Software Development for Government.** Contact: Conference Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903. Also being held March 24-27 in Los Angeles, March 31 to April 3 in Atlanta and April 14-17 in Denver.

MARCH 17-21, BALTIMORE — **Basic Systems Analysis.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

MARCH 17-21, BOSTON — **James Martin's Productivity Seminar.** Contact: Technology Transfer Institute, 741 Tenth St., Santa Monica, Calif. 90402. Also being held March 24-28 in Washington, D.C.

MARCH 17-21, MILWAUKEE — **Test Data Acquisition and Processing for Instrumentation Applications.** Contact: John T. Snedeker, Program Director, Center for Continuing Engineering Education, University of Wisconsin-Milwaukee, 929 N. Sixth St., Milwaukee, Wis. 53203.

MARCH 18, LOWELL, MASS. — **Successful High Technology Companies in Europe.** Contact: Leslie Hansen, Nutter, McClennen & Fish, Federal Reserve Plaza, 600 Atlantic Ave., Boston, Mass. 02210.

MARCH 18, SAN JOSE, CALIF. — **U.S. Invitational Computer Conference Series.** Contact: Suzanne Hubner, U.S. Conference Director, The Invitational Computer Conference, No. C-2, 3151 Airway Ave., Costa Mesa, Calif. 92626. Also being held April 2 in Nashua, N.H.

MARCH 18-19, LOS ANGELES — **Systems/34, 36 and 38 Users Show.** Contact: Andrew Wahtera, The Producers, 360 Merrimack St., Lawrence, Mass. 01843. Also being held April 15-16 in Chicago.

MARCH 18-20, ALBUQUERQUE, N.M. — **Integrated Fiber-Optic Technology Training.** Contact: Linda Castle, Optoelectronic System Consultants, P.O. Box 35525, Albuquerque, N.M. 87176.

MARCH 18-21, LAS VEGAS — **Check Processing.** Contact: Peggy Meyer, Bank Administration Institute, 60 Gould Center, Rolling Meadows, Ill. 60008.

MARCH 19-20, ARLINGTON, VA. — **Electronic Data Interchange Association Training Session.** Contact: Transportation Data Coordinating Committee, Suite 712, 1101 17th St. N.W., Washington, D.C. 20036.

MARCH 19-20, NEW YORK — **The 1986 Strategic Planning Conference.** Contact: The Conference Board, Inc., P.O. Box 4026, Church Street Station, New York, N.Y. 10261.

MARCH 19-21, BLACKSBURG, VA. — **Personal Computer Interfacing for Scientific Instrument Automation.** Contact: Linda Leffel, Virginia Polytechnic Institute and State University, Blacksburg, Va. 24061.

MARCH 19-21, LAS VEGAS — **CDLA Spring Meeting.** Contact: Dianne L. Sims, Manager of Convention Planning, Computer Dealers and Lessors Association, Inc., 1212 Potomac St. N.W., Washington, D.C. 20007.

MARCH 22, NEW YORK — **The Fifth Annual Conference of the New York City Chapter of the Association for Women in Computing.** Contact: Association for Women in Computing, New York City Chapter, Box 2293, Grand Central Station, New York, N.Y. 10163.




### WEEK OF MARCH 23

MARCH 24-26, CHICAGO — **Systems One Conference and Exposition.** Contact: Michael A. Tew, Technical Activities Department, Society of Manufacturing Engineers, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

MARCH 24-26, LAS VEGAS — **Fifth Annual International Spectrum USA.** Contact: Amy Krainock, International Data Base Management Association, Suite 104, 9740 Appaloosa Road, San Diego, Calif. 92131.

MARCH 24-26, LAUREL, MD. — **Association for Computing Machinery's Conference on Ada Use in Fo-**

**cus: Practical Lessons in Perspective.** Contact: Connie Finney, Johns Hopkins University, Applied Physics Laboratory Computer Society, Johns Hopkins Road, Laurel, Md. 20707.

MARCH 24-27, SAN FRANCISCO — **Personal Computer Networks in Government.** Contact: Conference Manager, U.S. Professional Development Institute, 1620 Elton Road, Silver Spring, Md. 20903. Also being held April 8-11 in Dallas.

MARCH 24-27, SINGAPORE — **Artificial Intelligence '86 Conference: AI and its Applications — A State of the Arts Review.** Contact: John Tagler, Elsevier Science Publishers, 52 Vanderbilt Ave., New York, N.Y. 10017.

MARCH 26-27, CAMBRIDGE, MASS. — **The Lotus Developer Conference.** Contact: Mark Scapicchio, Lotus Development Corp., 55 Cambridge Pkwy., Cambridge, Mass. 02142.

## WEEK OF MARCH 30

MARCH 31-APRIL 1, NEW YORK — **Software Tools Conference on Artificial Intelligence/Expert Systems.** Contact: Software Tools Conference, Conference Office, Suffolk University, Boston, Mass. 02108.

MARCH 31-APRIL 2, RICHMOND, VA. — **The Annual Parnassus Management Conference.** Contact: Parnassus, Inc., 100 Boylston St., Boston, Mass. 02116.

MARCH 31-APRIL 2, TORONTO — **Systems Project Management.** Contact: Thomas J. Bisacquino, Director of Education, Association for Systems Management, 24587 Bagley Road, Cleveland, Ohio 44138.

APRIL 2-3, DALLAS — **Fifteenth Annual ICP Million Dollar Awards and Executives' Conference.** Contact: Sue Stewart, International Computer Programs, Inc., P.O. Box 40946, 9000 Keystone Crossings, Indianapolis, Ind. 46240.

APRIL 2-3, SAN DIEGO — **Frost & Sullivan's Fourth Annual Computer Vertical Market Conference.** Contact: Carol Every, Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

## WEEK OF APRIL 6

APRIL 6-9, NEW ORLEANS — **Electronic Funds Transfer Association Annual Convention and Exposition.** Contact: Convention Coodinator, Electronic Funds Transfer Association, Suite 1000, 1726 M St. N.W., Washington, D.C. 20036.

APRIL 7-10, SAN FRANCISCO — **1986 IEEE International Conference on Robotics and Automation.** Contact: Harry Hayman, Institute of Electrical and Electronics Engineers Council on Robotics and Automation, Exeter C3037, Boca Raton, Fla. 33434.

APRIL 7-10, WASHINGTON, D.C. — **Federal Office Systems Expo '86.** Contact: Renee Clark, National Trade Productions, Inc., Suite 400, 2111 Eisenhower Ave., Alexandria, Va. 22314.

APRIL 7-11, ORLANDO, FLA. — **Tutorial Week Orlando '86.** Contact: Martez A. Camilleri, Director of Tutorials, Institute of Electrical and Electronics Engineering Computer Society, 1730 Massachusetts Ave. N.W., Washington, D.C. 20036.

APRIL 8-13, TEL AVIV — **International Conference on Courseware Design and Evaluation.** Contact: Benjamin Feinstein, ICCDE Organizing Committee, Israel Association for Computers in Education, P.O. Box 13009, Hakirya, Romema, Jerusalem 91130 Israel.

APRIL 9-11, LOS ANGELES — **Corporate Electronic Publishing Systems: A Conference/Showcase III.** Contact: Cahners Exposition Group, 999 Summer St., Stamford, Conn. 06905.

APRIL 9-13, SINGAPORE — **Communicasia '86.** Contact: Gerald Kallman, Kallman Associates, Five Maple Court, Ridgewood, N.J. 07450.

## WEEK OF APRIL 13

APRIL 13-17, LAS VEGAS — **The 1986 National Interact Conference.** Contact: Management Science America, Inc., 3445 Peachtree Road N.E., Atlanta, Ga. 30326.

APRIL 14-16, MONTEREY, CALIF. — **Information System Support for Integrated Design and Manufacturing Processes Workshop.** Contact: Michael J. Zyda, Naval Postgraduate School, Department of Computer Science, Code 52, Monterey, Calif. 93943.

APRIL 14-17, PHOENIX — **Twenty-Fourth International Magnetics Conference.** Contact: Conference Chairman, J.U. Lemke, #1103, 2400 6th Ave., San Diego, Calif. 92101.

## WEEK OF APRIL 20

APRIL 20-25, NEW ORLEANS — **Twenty-Fourth Annual Conference of the Association for Educational Data Systems.** Contact: Association for Educational Data Systems — '86, P.O. Box 5689, Columbus, Ga. 31906.

APRIL 21-24, CHICAGO — **Robots '86 Conference and Exposition.** Contact: Robotics International of the Society of Manufacturing Engineers Public Relations, P.O. Box 930, One SME Drive, Dearborn, Mich. 48121.

APRIL 21-24, WASHINGTON, D.C. — **Sixth International Conference on Decision Support Systems.** Contact: Julie Eldridge, Decision Support Systems — '86, 290 Westminster St., Providence, R.I. 02903.

APRIL 23-25, DALLAS — **Eighteenth International Management MIS Conference.** Contact: Bruce Brammer, Paper Industry Management Association, 2400 E. Oakton St., Arlington Heights, Ill. 60005.


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# COMPUTER INDUSTRY

*Section begins on page 134*

# New York company to offer electronic off-site data storage



Chairman Paul Catalano in Dataport's tape storage library

By Charles Babcock

NEW YORK — In an abandoned railroad terminus 100 feet below the World Trade Center, a data storage site capable of linking up to a fiber-optic network is taking shape. The builder, a start-up firm called Dataport, is planning to offer local DP shops the option of off-site data backup through electronic transmission.

Off-site storage is practiced by most data processing sites to avoid a catastrophic loss of data in the event of fire or other disaster. The backup data is usually stored on reels of tape, which are physically shipped to the storage site. To date, the backup data transfer has not been accomplished electronically because the copper wire forms of transmission are too slow to handle the massive amounts of data, MIS directors say.

But Paul D. Catalano, chairman of Dataport, Manhattan's first large-scale data storage site, says the delivery of backup data has been mired in the "CTAM process — Chevy Truck Access Method." With the aid of high-speed, fiber-optic links, Catalano says he thinks the transfer can be accomplished electronically at lower cost. At this point, the possibility both intrigues and concerns local MIS managers.

"It's an interesting concept at the right time in the evolution of the industry," says Thomas J. Lee, senior vice-president for systems and computing at the Depository Trust Co. in New York. In processing the exchange of money and securities between financial institutions, brokerage houses and their customers, Depository Trust transports 700 reels of backup tape a week to Iron Mountain, a storage facility 90 miles north of Manhattan.

At Morgan Stanley & Co., where the main data base occupies 20 IBM 3380 disk packs, the prospect of electronic off-site storage is intriguing to data base administrator Steven Cownie. "The concept sounds nice, but I would have a lot of concerns," he says. A key concern is the speed with which a site could recover if its system went down, he says.

> ***"The planned site of the data storage experiment is the terminus of chambers and tunnels originally dug for the Hudson-Manhattan Railroad in the late 1800s."***

Lee points out that to take advantage of "electronic vaulting," Dataport will need not only a fiber-optic link to its client but also high-speed memory devices capable of recording data faster than standard disk drives or tape recorders.

In addition, electronic vaulting in its most direct sense would require computer equipment capable of writing to two different locations simultaneously, creating a mirror image of critical files. Dual-write equipment does not exist yet, but Depository Trust has informed Storage Technology Corp., IBM and Memorex Corp. that dual-write capability will be a requirement in its future systems. "I see the technology moving in that direction," Lee says.

Catalano has formed a task force to get an electronic vaulting pilot project up and running this year. Its members include consultants from AT&T, Sun Guard — a disaster recovery firm in Philadelphia — and Merrill Communications, a subsidiary of Merrill Lynch & Co. "If properly programmed, the 10% of the data base that represents critical files could be simultaneously updated off-site by the central processor unit during the on-site update," he says.

Ironically, the planned site of this experiment is the terminus of chambers and tunnels originally dug for the Hudson-Manhattan Railroad in the late 1800s. The early engineers so feared the waters of the Hudson River that they built concrete walls 30 feet thick to protect the railroad. To install an elevator shaft for the World Trade Center, construction crews found themselves using diamond saw blades to cut through a cement ceiling that was 9 feet thick.

In addition to such inherited protection, Dataport has the climate control, fire suppression and guard station facilities one would expect in a secure facility. In addition to sprinklers, Dataport's tape library is equipped with a Halon tank system that consumes much of the oxygen in the air at the first sign of a fire.

Dataport is putting $3 million into building the facility, with the Port Authority of New York/New Jersey investing an additional $1 million. Catalano earlier converted an obsolete AT&T shelter for communications gear in Raritan, N.J., into a data storage site called Vital Records, which he still operates. He is also former manager of the Iron Mountain storage site.

"He has to walk before he runs," says Depository Trust's Lee, "but he's coming along with a service just as the vendor technology is falling into place."

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# Europeans agree to standards compliance test

## Support for conformity from 15 firms, agencies

By Alex Scott
Computerworld News Service

BRUSSELS — Fifteen companies and government agencies from eight European nations have signed agreements with the European Community under which the companies will have their information technology equipment tested for conformity with international communications standards.

Participants in the program include the Bundespost, West Germany's postal and telecommunications authority; Telefonica, the Spanish telephone company; the Centre National d'Etudes des Telecommunications in France; and British Telecom PLC.

Under the agreements, the newly created European Conformance Testing Service for Information Technology and Telecommunications will test products to determine their compliance with the specifications of such standards-setting bodies as the Geneva-based International Standardization Organization.

A spokesman for the testing service said it is practically impossible to ensure that such complex standards as the Open Systems Interconnect (OSI) model will become widespread without conformance testing. He added that testing would "ensure the conformity of standards for the end user."

The European Community is expected to provide approximately half the funding, or about $9.3 million, to create the testing centers. After their start-up phase, the testing centers reportedly will enter commercial operation.

Each test center will specialize in different areas, such as OSI languages and Graphical Kernel Systems. The centers reportedly will be providing basic services within six to 18 months, depending on the complexity and stability of each standard.

# Daisy staff cut 10% to stem expected loss

By Maura McEnaney

MOUNTAIN VIEW, Calif. — Anticipating significant second-quarter losses, Daisy Systems Corp. laid off 100 of its 1,000 employees in Mountain View recently as part of what it called a "substantial cost-reduction program."

The stock price of the formerly high-flying computer-aided engineering (CAE) systems manufacturer has been falling since January, when Daisy representatives told security analysts in San Francisco that revenue for the second quarter ending March 31 would be well below previous-quarter sales of $36.5 million.

Net income for the first quarter ended Dec. 31 was $6.3 million. In fiscal 1985, Daisy recorded sales of $122.5 million.

Following the layoff announcement, Daisy stock prices fell to an all-time low of $10 per share.

*Computer Industry section begins on page 134.*

At the January meeting, Daisy said that recently implemented quality control methods caused some delay in product delivery. However, some observers suggest that stricter quality control was implemented after Daisy rushed uncompleted products out the door to meet quarterly revenue goals.

At the January meeting, Daisy told analysts that some new quality control methods would delay second-quarter shipments, resulting in lost revenue. A Daisy spokesman said the company had often hired temporary help at the end of the quarter to meet quarterly revenue goals. But because more products built at the end of the quarter had functional problems, the company discontinued using the temporary help and shipped fewer products instead.

Daisy officials admitted the company did ship an "insignificant" number of faulty products.

Daisy's problems stem from its "more is better" approach and use of multiple vendors' products in its CAE systems, according to Robert Heriwick, an analyst at Hambrecht & Quist in San Francisco. "The customers are confused," Heriwick said.

Customers were further confused when Daisy announced a version of its Personal Logician design system that incorporates the Digital Equipment Corp. Microvax II rather than Daisy's proprietary hardware that was already in the marketplace. A two-month delay in delivery of the Microvax version added to market uncertainty.

Nevertheless, Heriwick said he believes Daisy's falling stock prices have not bothered users.

Herwick predicts Daisy will be profitable during the third quarter, provided that the long-anticipated Logician VX is shipped at the end of the month. A Daisy spokesman said it is more likely the product will not be available until next quarter.


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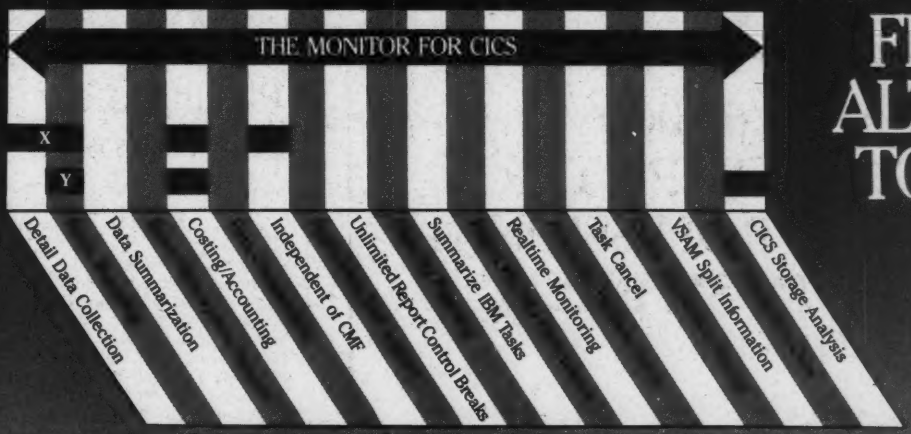
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# Vendors, user companies up the ranks of COS association

WASHINGTON, D.C. — Data General Corp., Texas Instruments, Inc. and three more user companies were among 13 new members announced by the new Corporation for Open Systems (COS) standards-setting body last week.

User companies Du Pont Co., Bechtel Power Corp. and Hughes Aircraft Co. joined to give COS five user companies out of 37 total members. Boeing Computer Services Co. and Eastman Kodak Co. had previously been reported as joining the communications standards consortium [CW, Feb. 24].

Other information systems vendor members announced last week were ITT, Sytek, Inc., Concurrent Computer Corp., Excelan, Inc., Touch Distributed Systems, Inc. and the SEL Computer Systems Division of Gould, Inc.

The COS also held a closed organizational meeting last week to incorporate its bylaws and elect a board of directors.

# Norwegian firm closes U.S. facility

**By Knut Ivar Skeid and Toralv Oestvang**
Computerworld News Service

OSLO — Tandberg Data A/S, the Norwegian maker of computer terminals and streamer backup storage devices, recently decided to shut down its factory in Anaheim, Calif., and announced that the company's president has resigned. The plant closing will cost 70 employees their jobs at the Anaheim facility.

The U.S. factory, opened in January 1985, was set up to help Tandberg penetrate the U.S. market for streamer backup equipment. Tandberg Data products will still be sold in the U.S. through West German electronics giant Siemens AG, Tandberg's main shareholder.

If operations had continued, the plant would have lost an estimated $5.5 million in 1986, the company said. Tandberg said it found itself unable to match the prices of U.S. competitors, most of which manufacture in the Far East.

Tandberg Data President Ralph Hoibakk said his resignation has nothing to do with the decision to close the U.S. plant. He will be succeeded by Hans Lodrup, currently vice-president.

Tandberg Data reported earlier that revenue for the fiscal year ended Sept. 30 was only half that expected. The poor results were blamed on heavy losses in the U.S., though Tandberg said the its performance in Europe was "better than expected."

Britain's International Computers Ltd., West Germany's Nixdorf AG, Norway's Norsk Data A/S and L. M. Ericsson of Sweden have all signed contracts with Tandberg Data.


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# Playing safe & taking risks

From page 134

machines will use the high-speed architecture.

The result? Two vastly different approaches: one daring, one conservative. Suprisingly enough, both make perfect sense.

For Compaq, the world of personal computing is circumscribed by the parameters set by IBM. Not only can Compaq never veer from the IBM DOS standard, it cannot afford to risk pioneering a new avenue in technology, such as 16M-byte addressing. If it did, "no one would buy it, because this may not be the way IBM goes," says personal computer industry analyst Aaron Goldberg of International Data Corp. in Framingham, Mass.

***Computer Industry section begins on page 134.***

Instead, Compaq has continually tried to offer a product that is slightly faster, lighter or cheaper than IBM's — but still compatible.

Hewlett-Packard has also chosen the right direction, but for different reasons. With no de facto standard imposed upon it, HP has great freedom — and a mandate to be daring. While Compaq can make a good living in the shadow of the Armonk Giant, HP must try to stay a step ahead of IBM, even if it must put the company on the line to do so.

In recent months, HP has also been under pressure to upgrade its line to meet the speeds offered by such competiting machines as Digital Equipment Corp.'s VAX 8650.

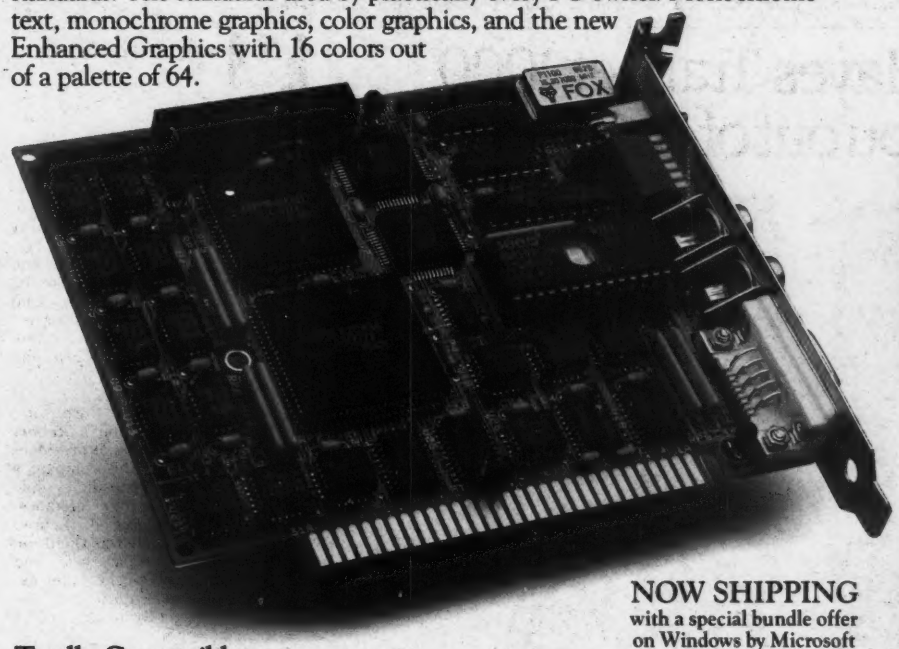
The strategies chosen by Compaq and HP fit the constraints of their respective markets and create big opportunities for growth. But while the strategies make sense, the stock market is waiting to see if they will pay off.

Although Spectrum convinced some analysts — such as Peter Schleider of L. F. Rothschild, Unterberg Towbin — to recommend a buy of HP stock, most of Wall Street still feels it's too early to tell. So far, both Compaq's and HP's stock prices have remained basically unchanged by their respective announcements.

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# Spectrum signals no philosopy shift

From page 134

and very interdependent in all regards, I think the consolidated approach that we took is one of the keys of getting it done properly. I think we would take a similar approach in the future under similar circumstances."

The general manager of ITG, George Bodway, explained that the group will be responsible for bringing out new products every three to four months over a period of the next few years.

Previously, each division supported its own products, which analysts complained led to incompatibility among the HP 3000 general-purpose computing systems, the HP 9000 engineering systems and the HP 1000 manufacturing systems.

"The divisions no longer do all their own research and development," Bodway said.

Bodway reported that HP established an informal organization of managers from throughout the company to deal with problems that arose during development.

"As we went through the transition, there was a question as to what people's responsibilities would be. This was one way of answering that," he said.

**Team may be expanded**

Morton said the 1,000-member team will stay together and may be expanded as coordination with production becomes more crucial during the next year.

Morton claimed that 1986 revenue will be unharmed by the shipment delays in Spectrum. "By introducing now and by divulging full information about our plans for migration, upgrade capability, data communications and data base management, we will give even more confidence to our customers to continue with present purchases," he said.

Until the Spectrum machines are shipped, HP also hopes to keep its customer base satisfied with its simultaneous introduction of the Series 70, which is based on the current 3000 architecture and is available now.

**'Significant step forward'**

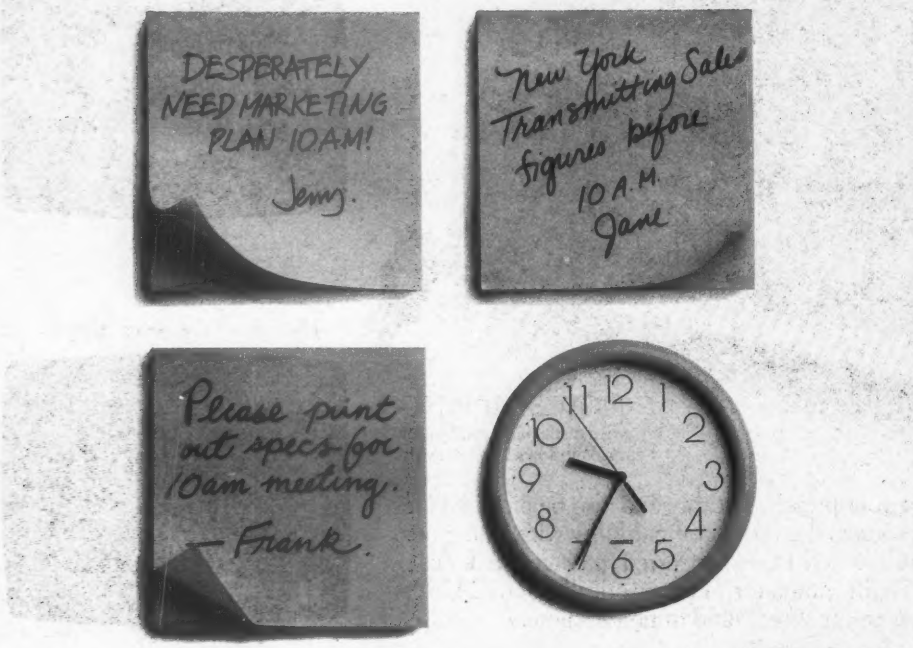
"It is a significant step forward in terms of price and performance," Morton said. "That will help some people who currently are up against some constraints in terms of speed and power."

However, Morton declined to predict that the Series 1 will make up for the short-term revenue that could have been provided by a new line of complex architecture machines such as those introduced by Digital Equipment Corp. and Data General Corp. Instead, he said the company opted for "the informed gamble" of an architecture that can be used for 10 to 15 years.

In terms of revenue, the New York investment firm of L. F. Rothschild, Unterberg Towbin predicted that Spectrum will produce $500 million to $750 million in revenue for fiscal 1987, which begins November 1986.

*CW West Coast correspondent Maura McEnaney contributed to this story.*


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## EXECUTIVE CORNER

**Joseph W. Rooney** has joined Corvus Systems, Inc. as executive vice-president. Rooney will have executive responsibility for the daily operations of Corvus' newly organized retail, value-added reseller and OEM groups as well as for marketing services and communications and field services. Before joining Corvus, Rooney served in senior executive positions with IBM, RCA Corp. and Calcomp.

■

Intelligent Systems Corp. announced the appointment of **Robert G. Brown** to the position of president of Quadram Corp., the company's Norcross, Ga.-based subsidiary specializing in microcomputer enhancements. Brown replaces **J. Leland Strange**, who has acted as Quadram president during the past year, and will continue as president, chief executive officer and chairman of the board of Intelligent Systems.

■

Softsel Computer Products, Inc. has announced the appointment of **Michael D. Pickett** as president and chief operating officer, succeeding **Thomas P. Mullaney**. Mullaney will continue to assist the company as an advisory director and said he plans to maintain an investment position in Softsel.

■

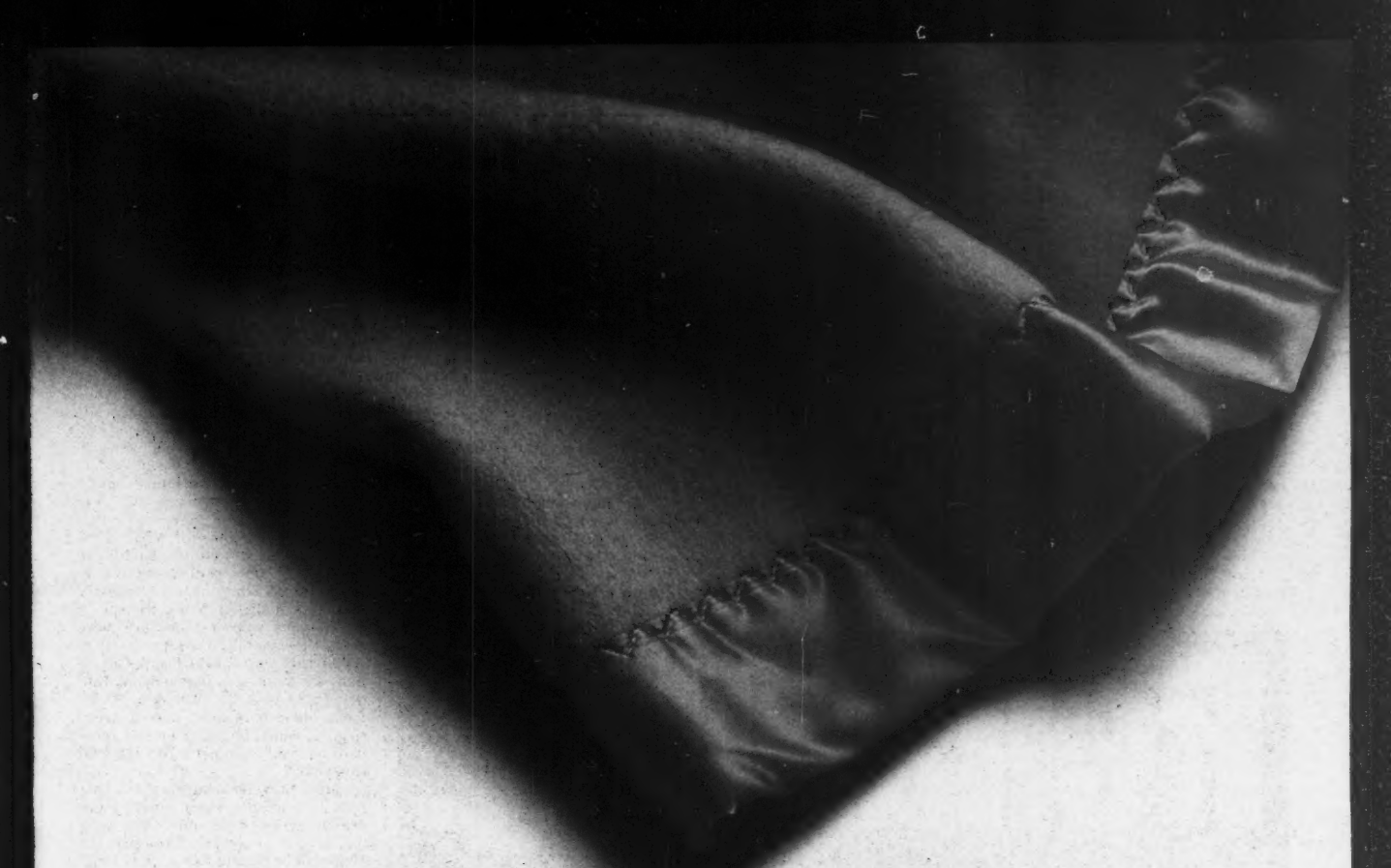
Sterling Software, Inc. has announced the appointment of **Warner C. Blow** as president of Sterling's Information Services Group. Blow is the former group vice-president of Informatics General Corp.'s distribution and retail systems business, and prior to that he was a division chief executive for Automatic Data Processing, Inc.

■

**James W. Sedin** has been elected to chairman of the board of directors at Mountain Computer, Inc., where he was most recently president and chief executive officer of the firm.

■

**Paul L. Rosenbaum** has been named president and chief executive officer of Xyplex, Inc. Most recently, Rosenbaum was president of Proteon, Inc., and prior to that, he was president and chief executive officer of Scitex America Corp. and also vice-president of Codex Corp.'s International Operations.



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# DEC success, AT&T acquisition among analysts' predictions

## Bearish expectations for IBM, Apple in 1986

**By Rosemary Hamilton and Douglas Barney**

CAMBRIDGE, Mass. — Digital Equipment Corp. will be the success story of 1986 as other major vendors like IBM, AT&T and Apple Computer, Inc. remain caught in the doldrums of 1985. Meanwhile, Xerox Corp., nearly a forgotten player in the computer industry, is expected to make a major comeback this year.

Those, at least, were the predictions of William F. Zachmann, vice-president of corporate research at International Data Corp. (IDC) in Framingham, Mass., who spoke at IDC's 21st Annual Information Industry Briefing Session last week. His opinions, which traditionally stir up their share of controversy, were both supported and challenged by other industry watchers nationwide.

Zachmann's bearish outlook for IBM, because of an expected drop-off in personal computer market share and less-than-promising sales in both mid-range and high-end systems, was considered shortsighted by at least one analyst.

"IBM will do better than some may think," said Jay Stevens, an analyst with Dean Witter Reynolds, Inc. "They're pricing aggressively now and simply have lots of opportunity. But weak capital expenditures in the U.S. are going to affect sales, and IBM has said so. They expect capital spending to be worse this year than it was in 1985."

Zachmann, however, continued to suggest — as he did with his 1985 predictions — that IBM has fundamental problems that go beyond the decrease in capital spending. The year "1985 wasn't a temporary accident," he said.

Zachmann maintained that a major shift in the computer industry from large to microprocessor-based systems is under way and will rob IBM of its major revenue source. "Microprocessors will overthrow the established order, and it will be as devastating as when the meteorite hit earth and killed off the dinosaurs 65 million years ago," he said. "IBM, with its quasi monopoly of large systems, has engaged in quasi-monopoly pricing and has come to depend on that."

Meanwhile, DEC has gotten its house in order and is in its best position in many years to compete with IBM. "DEC will do well because of its product line, its networking capability and its aggressive pricing," Stevens of Dean Witter said.

The 1986 outcome for AT&T drew the most varied opinions. Zachmann said AT&T "is bleeding red ink in computers," but other industry watchers qualified their criticism.

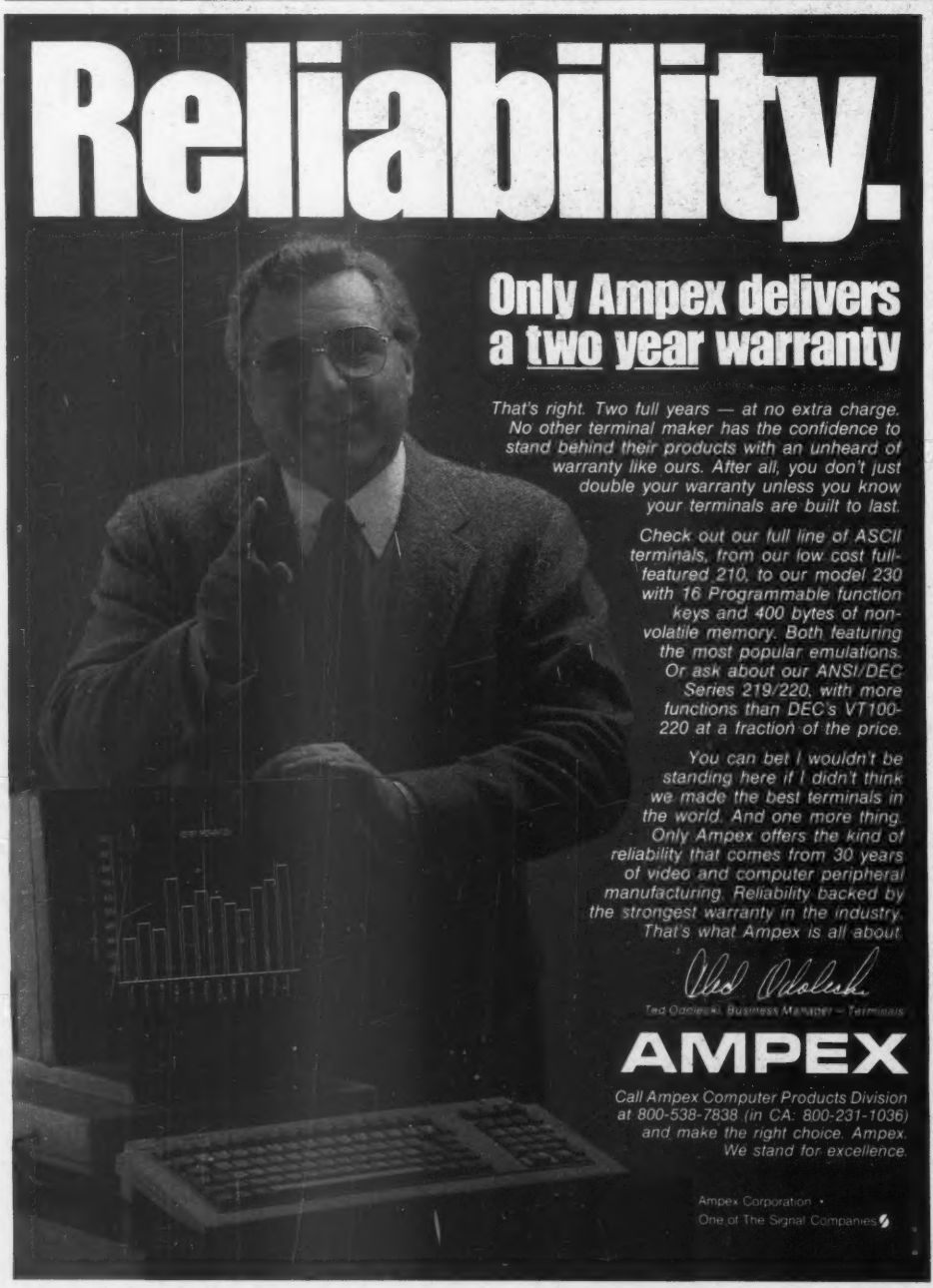
"If your expectations are very high, then you'll be disappointed in AT&T this year," said Frank Governali, assistant vice-president at Kidder, Peabody & Co. "I look at AT&T from where it is and where it needs to go. It would be ludicrous to expect it to be really competitive with IBM this year."

But Stevens suggested that AT&T's computer woes require more drastic action. "The only way they will become a computer company in 1986 will be through an acquisition," he said. "Otherwise they'll forever be a phone company on the fringes of the computer business."

All three analysts said they expect AT&T to go shopping this year.

Fellow analysts also found reason to disagree with Zachmann's sour Apple predictions. "Apple will have a poor year on the sales side, but they will have an excellent year on the earnings side because the cost cutting will have a major effect in 1986 on their earnings," said Eugene G. Glazer of Dean Witter. "I think it will be a solid 1986 for Apple," said Michael Millikin, a consultant with the "Seybold Report On Office Systems."

Xerox's comeback will be based upon desktop publishing activities and the broadening of the firm's product line, Zachmann said. Analysts said they believe that Xerox's large direct sales force and strategy of adding value to hardware with software may pay off.



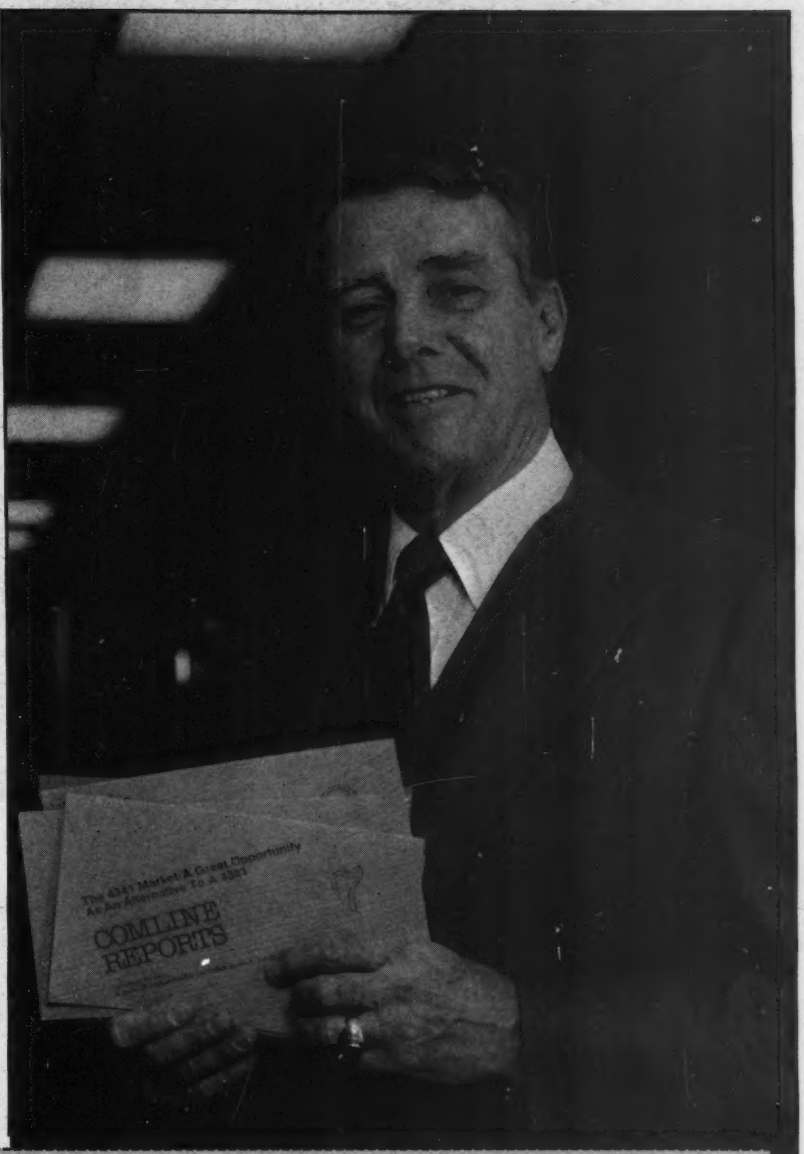

## Sikes appointed to Commerce post

WASHINGTON, D.C. — The Reagan administration in a surprise move recently appointed Alfred C. Sikes to be assistant secretary of commerce for communications and information. Sikes is expected to articulate the administration policy in telecommunications matters.

Sikes' appointment was a surprise because Acting Assistant Secretary Rodney Joyce was known to be favored by Commerce Secretary Malcolm Baldrige. Joyce, the former Republican counsel to the House Telecommunications Subcommittee, has wide experience in telecommunications issues.

Sikes, a political consultant from Missouri, has been the head of his own political consulting firm Sikes & Associates, Inc.

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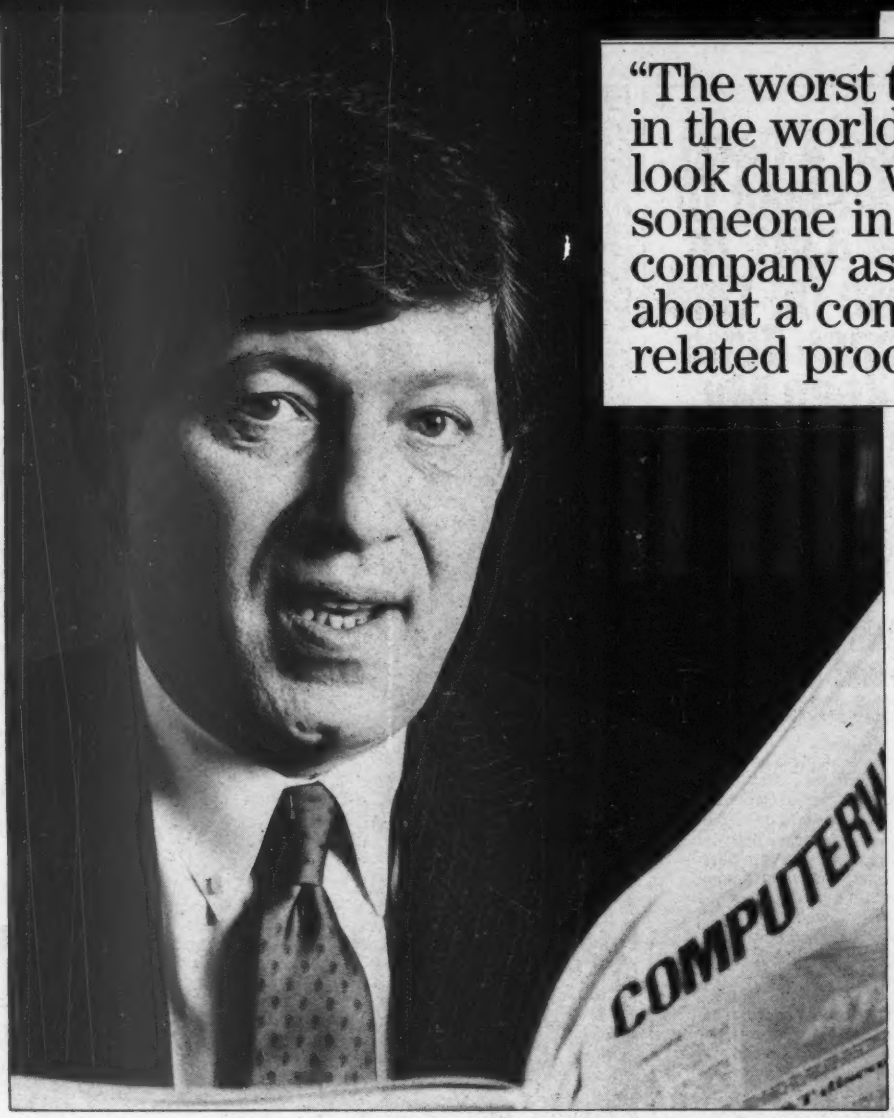
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# Software locks have potential to harm more than to help

**OUTSIDE LINES**
L. J. Kutten

Many computer programs have a lock in them that causes them to cease operation at a future date. These locks come in two forms: defensive and offensive.

A defensive lock merely shuts down the program without damaging the program or data. For example, Xerox Corp. freely distributes the Phoenix Version of its Validator Spelling Verification Program. This version allows a user to experience all the capabilities of the program for 100 documents. After the 100th document has been verified, the program shuts itself down. To reactivate it, a user must purchase a password from Xerox.

An offensive lock does much more; it destroys itself and/or the data it creates. One method uses the internal clock of an IBM Personal Computer. The first time the program is run, it writes the data to both the source and destination disk. When more than a predetermined time period passes, the lock trips and the program self-destructs by erasing itself.

Some offensive locks go even further and destroy user-created data files.

Once the developer is paid, it sends upgrades or some other information that deactivates the lock.

The trouble with any software lock is that it is a very dangerous device to use. A risk that the lock will be tripped improperly and cause injury to data is always present.

Many software developers who use software locks justify their use by stating that they prevent piracy and ensure payment of fees. They claim the lock will never injure an innocent user.

But assume for a moment that the software developer has in fact been paid, but due to an unforeseen event — for example, an unexpected trip out of town, the mail gets delayed, the wrong version of the program is shipped and so on — the lock is not removed, it trips automatically and the consumer suffers an injury. Who should bear the loss — the innocent consumer who paid for the software or the developer who installed the lock?

### The law of spring guns

A partial answer might be found in the law of spring guns. A spring gun is a hidden gun, usually a shotgun, rigged to fire when a wire attached to its trigger is disturbed.

If the law of spring guns even partially applies to software, the developer will be held liable because it set the trap. The developer knew of the trap's presence and knew what would set it off.

Furthermore, a developer might be liable for a lock that injures even a pirate. There are a number of cases in which a property owner has been found liable to a thief who is injured while robbing his house.

If a lock must be used, the developer can limit its liability by advising the user in advance of the lock's existence, only shutting down the program and under no circumstances removing or modifying any user-created data files.

*Kutten is a member of the Missouri and Illinois bars and author of* The Computer Buyer's Protection Guide, *published by Prentice Hall, Inc.*

# CDC, Philips plan joint venture

**By Stanley Gibson**

MINNEAPOLIS — Expanding their cooperative efforts to develop and sell computer storage products, N. V. Philips and Control Data Corp. last week announced a joint venture combining several of their divisions.

In a preliminary agreement, Dutch electronics giant Philips will have 51% interest and CDC will have 49% interest in the joint venture, which will be headquartered in Colorado Springs. The parties said they expect a final agreement by June 30.

The venture will include the operations of Optical Storage International, a CDC-Philips joint venture in Colorado Springs; CDC's OEM tape drive business, including its 80% interest in Computer Peripherals, Inc. of Valley Forge, Pa.; and Philips' activities in the professional compact disk read-only memory product market.

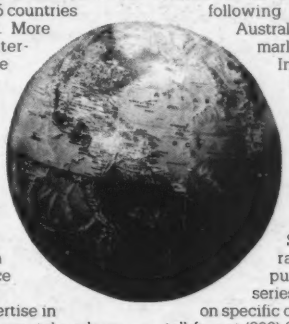
In a separate announcement, CDC said it signed a contract with Moddata, a major manufacturer of telecommunications products in Brazil, to transfer technology for the manufacture and sale of some of CDC's Cyber mainframes. The total value to CDC could exceed $100 million over the next six years, the company said.

The transfer of technology to build the entry-level mainframes will occur in several phases, beginning with the purchase of at least 18 Cyber mainframe Model 830 systems within the first year.


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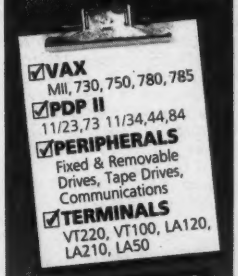
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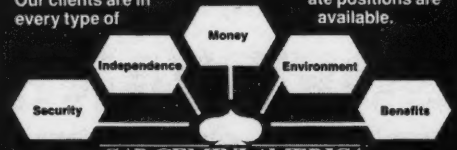
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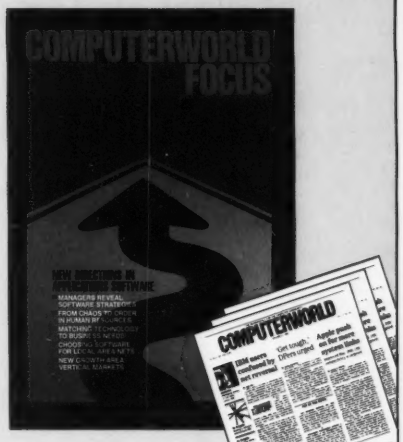
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**SYSTEMS ANALYST/ PROGRAMMERS**

To meet the demands of our expansion the County of Lake is recruiting four individuals to fill challenging positions available in an IBM 3083 environment. These people must have good communications skills and enjoy working in a progressive, highly visible position on a project team. These individuals should have proven skills in COBOL, Command Level CICS and Data Base techniques. DOS/VSE and CMS a plus. A minimum of 4 years experience is required, 4 year degree preferred.

**SYSTEMS SOFTWARE PROGRAMMER**

We are recruiting a qualified individual to fill a challenging position in an IBM 3083 environment. Requires a strong background in DL/I and CICS in a VM and DOS/VSE operating environment. Individual must have experience in problem determination, software maintenance, software installation and an understanding of the interrelationships of various software products.

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Your role in our ambitious program requires familiarity with entity/relationship data modeling and logical data design. Prior conceptual data modeling experience, in support of comprehensive application development efforts, preferred.

### ■ SR./LEAD DATA BASE ANALYSTS

In addition to 3+ years of application and physical data base design experience, strong coordination skills are needed to successfully support a variety of applications development projects.

### ■ SR./LEAD IMS SYSTEMS PROGRAMMER

This position requires 3+ years of demonstrated experience in problem determination resolution, performance analysis/tuning and software installation. Lead candidates must also have proven planning and management ability. IMS DB/DC, XA, TSO, JES2, DFHSM, SMP/E and Security knowledge desirable.

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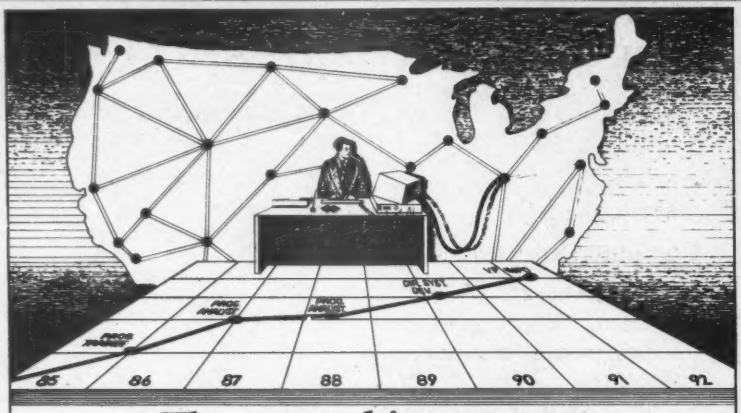
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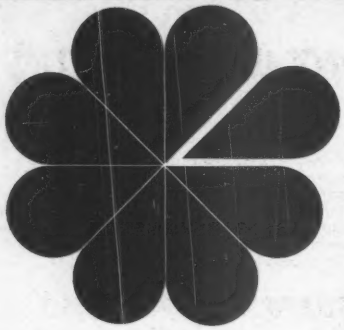
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| P/A - SQL, DB New Development | to $40K |
| P/A - DEC/VAX | to $36K |
| S/P - DEC/VAX | to $40K |
| S/P - CICS | to $40K |
| S/P - MVS | to $40K |
| DATA BASE ANALYST - IMS | to $38K |
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For additional information on these and other permanent or contract positions: call or send resume to Dave Kuratnick or Laree Shulman.

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Greensboro, NC 27415
(919) 373-1461 - collect

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37.5 hours per week. State supported college seeks a Programmer Analyst. Under general supervision, analyze, evaluate, and formulate methods and procedures for improvements of operations. Considerable knowledge of methods and techniques of computer programming and the capabilities and limitations of computers and peripheral equipment. Considerable knowledge of and experience with computerized accounting and/or college administrative systems. Considerable knowledge of methods and techniques of computer systems analysis. COBOL and RPG II programming experience highly desirable. IBM System/36 experience a plus. Minimum training and experience: a Bachelors Degree in Computer Science or Management and one year experience in computer systems development, modifications, maintenance and/or computer programming, or other appropriate combination of training and experience. Apply Personnel Services, Lander College, 311 Wilson Street, Greenwood, South Carolina 29646 by March 21st, 1986.

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**PROGRAMMER/ANALYST.** Utilizing knowledge of COBOL, ASSEMBLER, PASCAL, FORTRAN, BASIC, and UNIX-C computer languages, together with ability to evaluate client's needs, creating correspondingly appropriate computer program; clearly communicate technical material to lay clients for their own use. Will adapt material to computer owned by client and, where applicable, will design & implement computer software for clients, analyzing their needs and developing software to meet those needs, using appropriate computer language, such as COBOL, ASSEMBLER, PASCAL, FORTRAN, BASIC and UNIX-C. Convert, customize existing software, if feasible, according to analysis of client's requirements. Provide instruction, support services to clients, advising on acquisition of appropriate computer systems. 40 hrs. weekly, 9 a.m. - 5 p.m. $34,000/annum. MS in computer science with one year experience, or BS in computer science with 3 years experience. D.O.T. Code 012.167.066. Mail resumes to: NYS JOB SERVICE, JO# NY8009624; 97-45 Queens Blvd., Rego Park, NY 11374.

COMPUTER
SYSTEMS ANALYST

JOB ORDER NO. 656034

Analyze current methods, systems and procedures. Define new system requirements and develop new program specifications. Integrate communication and computing technologies with large computer mainframe technologies. Employ a combination of laser technology, bar code technology, personal computing and mainframe technology for administrative applications, to be applied in food services, library circulation, automated student accounting and on-line verification of student status. Maintain technical documentation to support the implementation of the new management information system. Must have Electrical Engineering background. M.S. in Industrial Engineering in Management Information Systems & Operations Research. 40 hrs/week, 9 a.m. to 5 p.m. $22,000.00/year. CONTACT: LA. DEPT. OF EMPLOYMENT SECURITY, 1991 Wooddale Blvd., Baton Rouge, Louisiana 70896

## DATA SECURITY ADMINISTRATOR

Perpetual American Bank is one of the largest financial institutions in the Washington D.C. area. We currently have 59 branch locations and $4 billion in assets, and we are growing!

We are seeking an individual for the position of Manager of Data Security Administration who can also serve as liason between this division and executive management. The candidate we seek will have the following:

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- **Experience in the evaluation, selection and installation of various DOS/MVS data security packages**
- **Experience in the establishment of disaster recovery sights and procedures**
- **Proven managerial skills**
- **Strong communication skills**
- **CISA or CSP certification**
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**Perpetual American Bank**
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**Alexandria, Virginia 22314**
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## SYSTEMS PROJECT MANAGER

Position requires minimum of 8 years experience in programming and systems analysis; 4 of which must be in a supervisory capacity.

Successful applicant must have demonstrable experience in installing and customizing the Walker Interactive Accounts Payable and General Ledger systems, the MSA On-line Fixed Assets and Information Expert Systems. This experience must be in a MVS/CICS/VSAM environment. Strong ASSEMBLER and COBOL skills in MVS/TSO/ISPF/JES2 and VM/CMS/DOS/VSE are required. Design experience in IDMS database software is necessary.

Position requires recruiting and/or training of competent personnel to develop and maintain complex on-line computer systems. Salary $38,240.00. Position requires minimum of 40 hours per week and on-call systems support outside normal business hours.

Interested applicants send resume and qualifications to:

**Department of Employment Services**
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**Louisville, KY 40202**
**Attn: Mr. White, File #148344**
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**Insurance experience**

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**(916) 922-5674**

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3924 Browning Place
Suite 7
Raleigh, NC 27609
(919) 782-3024

Systems Analyst - Determine software requirements; evaluate system effectiveness; modify and implement integrated banking systems software packages; maintain and enhance system software; serve as technical advisor to EDP staffs in problem analysis and system operation. Duties involve use of DEC PDP 11 and VAX 11 minicomputers, VAX Basic, BLISS-32 and DCL programming languages, VMS and RMS operating systems. Two years of university level coursework in mathematics, engineering or computer science and three years of experience in job offered or three years software design and analysis experience required. 40 hrs, 9-5, $35,000/yr. Mail resume to: NYS Job Service J.O. #8007918, 485 Fifth Avenue, NYC, 10017. Refer to D.O.T. 012167066.

Computer Graphics
Software Engineer

Apply knowledge of computer graphics, software engineering, and database systems to design and develop three-dimensional computer aided design systems; and to devise, develop and write computer packages on UNIX system for scientific and engineering applications. Requires Masters Degree in Computer Science. Education should include coursework in Computer Graphics, Software Engineering (including C Language and UNIX System), Distributed Database System, and Computer Communication Network. 40 hrs/wk, 8am to 5pm. $27,000/yr. Send resume and transcript of academic record to: 7310 Woodward Avenue, Room 315, Detroit, Michigan 48202. Reference # 13386. Employer Paid Ad.

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Progressive county government shop with VAX 785 and PDP 11 seeks first rate software pro as Project Leader for MIS applications. Must have strong skills in COBOL on VAX or PDP. Send resume and salary history to: Mr. Laymon, c/o William J. Reagan, Clerk Of Court, PO Box 413020, Naples, Florida 33941 or call (813) 774-8339.

Operations Research Analyst to be responsible for maintenance enhancement and research involving mathematic programs with embedded network structures. M.S. in Operations Research, experience with C language, and experience in mathematical programming. Salary: $30,000. Contact the Job Service Office at 700 Wade Avenue, Raleigh, N.C. or the Job Service nearest you. Refer to Job Order #NC5132146.

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Minimum qualifications include: 2 years teaching experience at either the secondary or post secondary levels (preferably in computer science, information systems, or computer related subjects) and a Master's degree (preferably in computer science, information systems or MBA). Publishing experience directly related to this position would be considered in lieu of teaching experience. Additional experience and/or coursework in computer subjects (i.e., BASIC programming language) highly desirable.

For immediate consideration, please forward your resume, including salary history and requirements to: South-Western Publishing Company, Marvin C. Good, V. P., Director of Electronic Publishing, 5101 Madison Rd., Cincinnati, OH 45227. Equal opportunity employer M/F/V/H.

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The Chittenden Bank, Vermonts' largest commercial bank, has an immediate opening for an experienced professional to administer the data processing audit function of the corporation. This will involve all programming utilizing audit software as well as the creation of system level audit reports.

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**Chittenden Bank**
**Attn: Sarah P. Merritt**
**2 Burlington Square**
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EOE M/F/H/V

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In our Technology and Systems Architecture Group, you will lead the definition and design of distributed systems architecture involving intelligent workstations. Requires a BS in Computer Science or Engineering backed by experience in software design/implementation, especially in systems utilizing LAN technology. Experience in API development based on OSI model is essential. Also required is experience with PC's, the UNIX* operating system, distributed file systems and distributed error recovery.

**Senior Software Analyst**

In our System Software Development Group, you will implement transaction processing and distributed systems based on state-of-the-art technology. We will look to you to act as field consultant for communications and system software for current and prospective customers. Requires a BS in Computer Science or Engineering backed by 5 years of experience in communications or transaction processing software. Knowledge of 'C' and M68000 assembler language, UNIX*, NCR TMX, SNA, X.25 and LANs desirable.

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Programmer/Analyst - Analyze, develop and implement commercial and accounting applications and on-line systems; write programs. Use IBM 4300, COBOL, DL/1, CICS, DOS/VSE. Bachelor's degree Computer Science. 2 years experience or 2 years as Programmer Analyst doing above using Burroughs mainframe, DMSII, LINC, COBOL, DASDL. 40 hour week. $37K per year. Mail resume: NYS Job Service, JO #NY8016184, 175 Remsen St., Brooklyn, NY 11201. DOT 012167066.

Data Base Systems Consultant - design, develop & implement financial data base systems for banks and financial institutions. Conduct hardware/software evaluation studies and capacity planning. Manage, develop and implement IMS data base systems to support accounting, inventory control, purchasing, payroll and personnel sys-systems. Analyze and design software packages. Manage and supervise technical staff. Requires knowledge of hardware/software system: IBM 30XX series, VAZ 750/780, DOS/VSE, VM CMS and ISPS, COBOL, FORTRAN, SAS, ACF2, RACF. Requires Bachelor's degree in Computer Science and 4 yrs experience in job offered. 40 hrs/wk. $60,000/yr. D.O.T. #169167.030. Mail resume to NYS Job Service, JO #NY8014566, 97-45 Queens Blvd., Rego Park, NY 11374.

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Performs difficult computer programming and systems analysis work in the maintenance and development of complex computer applications relating to municipal government. Requires a minimum of two years experience in programming, and considerable knowledge of RPG-III and Cobol. Prefer experience with an IBM 38 and a four year degree in data processing, computer science, or related field. Salary DOQ. Apply by March 31st 1986 at 211 West Aspen, Flagstaff, Arizona 86001. City of Flagstaff is an EOE. M/F/H

PROGRAMMER/ANALYST -- Design, code, test, maintain & enhance computer programs as related to various businesses utilizing COBOL, CICS, ADS/O, NATURAL, ADABAS & IDMS DB/DC. (IBM hardware) 4 yrs exp. or 4 yrs related programming exp. Pays: $35,000/yr, 40 hrs/wk. Send Resume to Pinkerton Computer Consultants, Inc., 111 Broadway, New York, NY 10006.

POSITION ANNOUNCEMENTS

## COMPUTER ANALYST

JOB ORDER NO. 656035

Software management for two disk pack storage systems and tape handling for mainframe computer and remote job entry system. Handle electronic communications between microcomputers and mainframe. Perform system operations for electronic bulletin board systems. Configure computer equipment and maintain microcomputers. Act as consultant for computer services for university agriculture community. Must have strong background in IBM mainframe and microcomputers and have knowledge of statistics and management of data storage and retrieval systems and electronic communications. M.S. System Science Degree with major in Computer Science. 40 hours per week. 8:00 a.m. to 4:30 p.m. $20,000/year. CONTACT: LA. DEPT. OF EMPLOYMENT SECURITY, 1991 Wooddale Blvd., Baton Rouge, Louisiana 70896.

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Systems Analyst / Computer Programmer, 40 hours per week, 9:00 a.m. to 5:00 p.m. Monday through Friday, $480.00 per week, to develop and implement data base system to enable employer, a wholesale Travel Agency, to keep track of airline tickets it sells to retail Travel Agencies. Also develop other systems as needed, including systems regarding accounts receivable and payable, payroll, etc. Uses RPG II as well as COBOL languages. Supervises at least 3 employees. Applicant must have had a course in RPG II Computer language. Must also have an MS in Computer Science or 2 years experience as a systems analyst/computer programmer or 2 years experience as a computer programmer. Send resumes to: Illinois Job Service, 910 South Michigan Ave., 3rd Floor, Chicago, IL 60605, ATTN: Joan Sykstus, Reference #5116-T.

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**COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171
**CW INTERNATIONAL MARKETING SERVICES**
**Managing Director/Frank Cutitta**
**COMPUTERWORLD**, 375 Cochituate Road, Box 9171, Framingham, MA 01701-9171
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Computerworld Headquarters: 375 Cochituate Road, P.O. Box 9171, Framingham, MA 01701-9171
Phone: (617) 879-0700, Telex: 95-1153.

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# Foreign Editorial/ Sales Offices

**Argentina:** Ruben Argento, Computerworld Argentina, Av. Belgrano 406-Piso 9, CP 1092 Buenos Aires. Phone: 34-5583/5584. Telex: 22644.

**Asia:** Euan Barty, Asia Computerworld Communications Ltd., 701-4 Kam Chung Bldg., 54 Jaffe Road, Wanchai, Hong Kong. Phone: (05) 8L63238. Telex: 72827 (COMWR HX)

**Australia:** Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 4395133, Telex: AA74752 COMWOR.

**Brazil:** Eric Hippeau, Computerworld do Brazil, Rua Pedroso de Morais 1553, 05419 Sao Paulo, SP Brazil. Phone: 814-9658-212-8750. Telex: 11 32017 (WORD).

**Denmark:** Preben Engell, Computerworld/ Danmark A/S, Torvegade 52, 1400 Copenhagen K, Denmark. Phone: (01) 955 695. Telex: 31566.

**France:** Axel LeBlois, Computerworld Communications S.A., 185 Avenue Charles De Gaulle, 92200 Neuilly Sur Seine, France. Phone: 747 1272. Telex: 613234 F.

**Italy:** Daniele Comboni, Computer Publishing Group S.R.L., Viale Restelli 5, 20124 Milano. Phone: (2) 688 9773. Telex: 333436 (GEJIT).

**Japan:** Mr. Shuji Mizuguchi, Computerworld Japan, 7-4 Shintomi 1-Chome, Chuo-ku, Tokyo 104. Phone: (03) 551-3882, Telex: 252-4217 (Computerworld Japan only).

Steven Yamada, Tokyo Representative Corp., Sanshin Kogyo Bldg., 2-10 Kando Jimbocho 3F, Chiyoda-ku, Tokyo 101, Japan. Phone: 230-4117, Telex: J26860 (reps for all CWCI publications except Computerworld Japan).

**Mexico:** Henry Morales, Computerworld Mexico S.A. de C.V., Oaxaca 21-2, Mexico City 7 D.F. Colonia Roma, 06700 Mexico. Phone: (05) 514-4218. Telex: 177 1300 (ACHAME).

**The Netherlands:** Wout Berends, CW Communications B.V., van Eeghenstraat 84, 1071 GK Amsterdam, The Netherlands. Phone: (020) 64 6651. Telex: 18242 (CWCOM NL).

**Norway:** Mr. Morton Hansen, CW Norge A/S, Hovinveien 43, P.O. Box 2862, Toyen, 0608 Oslo 6, Norway. Phone: (20) 64 77 25. Telex: 76476 9 (CW NOR N).

**People's Republic of China:** Chen Mingkun, China Computerworld, 74 Lu Gu Gun Road, P.O. Box 750, Beijing 10039, People's Republic of China. Phone: (47) 814 6174. Telex: 222214 (CCW CN).

**Spain:** Neil Kelley, Computerworld/Espana, Barquillo 21-3 izda, Madrid-4, Spain. Phone: 231 23 85; 231 23 86; 231 23 88. Telex: 47894 (CW E).

**Sweden:** CW Communications AB, Sodra Hamnvagen 22, S-115 41 Stockholm, Sweden. Phone: 46 8 67 91 80. Telex: 14904 9 (NOVACW).

**Switzerland:** Gebhard Osterwalder, CW Publikationen AG, Witikonerstrasse no. 15, CH - 8032 Zurich, Switzerland. Phone: (01) 55 10 77. Telex: 816710.

**Taiwan:** Grace Tang, ACE Media Agency Ltd., Room 503, 1, Fu Hsin S. Road, Sec. 1, Taipei, 10587, Taiwan, R.O.C. Phone: 751 3636. Telex: 14142 (ACE GROUP). (Representative for all CWCI publications).

**United Kingdom:** Martin Durham, CW Communications Ltd., 99 Grays Inn Rd., London, WCI 8UT, United Kingdom. Phone: (01) 831-9252, Telex: 262346.

Euan Rose, Bill Dunlop, Barbara Levy, Christine Taylor, Beere Hobson Assoc., 345 Goswell Rd., Islington, London EC1, United Kingdom. Phone: (01) 278 3415. Telex: 311951. (Representatives for CWCI publications).

**Venezuela:** Kalman von Vajna Nagy, CW Comunicaciones, C.R.L. Torre Maracaibo, Piso 10, Oficina H, Av. Libertador, Caracas, Venezuela. Phone: 72-76-30.

**West Germany:** Eckhard Utpadel, CW Publikationens GMBH, Friedrichstrasse 31, 8000 Munchen 40, West Germany. Phone: (089) 38172-0. Telex: 5215350.

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# Micropro offers amnesty to European software pirates

SAN RAFAEL, Calif. — Micropro International Corp.'s amnesty program for reformed software pirates has had an excellent response in the UK and France, according to Bjorn Eriksson, director of European product management. Local Micropro marketing officers are considering a similar plan in the U.S.

Under the amnesty program, prompted by new European laws extending copyright protection to software, would-be customers with illegal copies of such Micropro products as Wordstar and Wordstar 2000 send $60 with each disk containing an illegal copy to Micropro. The vendor will then attach a label with a serial number and register them as legal customers, entitled to upgrades and support.

Eriksson reports "a couple of hundred" responses in each country since the program was launched last fall. He estimates there are about 500,000 Micropro product users in Europe, half of whom are not registered users.

Micropro's policy of not copy-protecting disks makes its popular programs even more susceptible, he added.

As a second phase of the program, Micropro is sending educational, nonthreatening letters to officials of large corporations that are likely to be Wordstar users, reminding them of software copyright laws and describing such Micropro options as site licensing and volume purchase agreements.

The amnesty program will end this spring, Eriksson said, then Micropro will consider taking violators to court.

— Peggy Watt

# Intel hikes EPROM chip price 25%

SANTA CLARA, Calif. — Mirroring recent actions by its Japanese competitors, Intel Corp. last week raised the prices of its erasable programmable read-only memory chips by 25% over November levels.

The move characterized the end of a long period of falling prices that precipitated the U.S. semiconductor industry's worst slump in history. Depressed prices also caused Intel and other U.S. vendors to accuse Japanese firms of selling chips in the U.S. below cost in their successful effort to gain market share.

The International Trade Commission is expected to rule today on a so-called chip dumping suit filed by Intel, Advanced Micro Devices, Inc. and National Semiconductor Corp.

# Zenith wins military contract

From page 134

so, they won't have anything to capitalize on."

Zenith made it clear that it wants a greater piece of the commercial market. The company has done well in sales to schools, and late last year it launched a national accounts program that would provide incentives for greater dealer support.

**'They just haven't been visible'**

But Newman said Zenith needs to make more efforts of a similar type. "They just haven't been visible," he said. "They're not in many outlets. They don't reach the end users. They have to do something about that."

Timothy Williams, manager of competitive analysis at Future Computing, Inc., said Zenith also must clarify where it is positioned in the IBM-compatible market.

"While they've stated their intentions for the commercial market, I'm not sure where they plan to go," Williams said. "Is it the low, price-sensitive end or the higher, performance-related end? Or maybe it's the middle."

However, Williams added, the government contracts have "generated new customer awareness and give Zenith a strong hand to play."

Under the terms of the armed forces contract, Zenith will sell three versions of its Z-200 micros, a dual floppy version, a dual floppy with a 20M-byte hard disk and a hard-disk version with additional memory. Unlike the IRS contract in which Zenith will lease its portable Z-171 model to the IRS with an option to purchase, this contract calls for outright purchase.

The Z-200 models have a retail starting price of $3,999.

**All versions come with Windows**

All versions will come with Microsoft Corp.'s Windows software, and a number of packages in basic categories like word processing, data base management and spreadsheets can be purchased under the contract.

Other applications are being supplied by major vendors and lesser knowns alike because of different software specifications in the contract, according to contract project director Harold Arthur at the Air Force Computer Acquisition Center in Bedford, Mass.

The Air Force required some specific packages that it currently uses, such as Dbase II and Dbase III from Ashton-Tate. Then it listed specific functions it wanted for applications such as computer-aided design and would accept any vendor that provided those functions, allowing smaller software firms to win the business with substantial discounts.

The spreadsheet package is Enable from the Software Group, the same package that will be bundled with the portables for the IRS. Data base offerings are from Ashton-Tate and Condor Computer Co., and word processing offerings include Micropro International Corp. Wordstar Professional and Ashton-Tate's Multimate 3.3. "It's not an end-all shopping list, but it's a broad sampling," Gallagher said.

The military contract was actually a rebidding of a contract Zenith won in 1983 that will expire later this year.

According to Gallagher, the bidding was reopened, and "the government came out and said 'go at it.' "

The Z-200 was introduced in mid-1985 as a host of other AT-compatibles hit the market. Based on the Intel Corp. 80286 microprocessor, an entry-level version includes 512K bytes of main memory, expandable to 16M bytes, a 1.2M-byte disk drive, six expansion slots and Microsoft's MS-DOS 3.1.

# Communications stock makes for tricky hunting

**ACTIVE ISSUES**
Kathy Porteus

It's hunting season on Wall Street. As more stocks participate in today's robust market, uncovering undervalued stocks with growth potential becomes a challenge.

Currently trading at low levels, communications equipment companies may appear to offer investors such stock values. Yet, according to financial analysts and fund managers, value hunting amid communications equipment stocks is like firing into air.

Beyond unresolved regulatory issues and delayed effects from the computer industry slowdown, many communications equipment markets suffer from weak fundamentals. Intense price competition causing margin declines will likely hinder recovery efforts. Also, sluggish orders are expected to continue as long as potential customers withhold purchase decisions as they formulate long-range communications goals.

"The fundamentals are clearly bad in many areas of communications equipment, but not all," says Andy Schopick, a vice-president with Gartner Securities. He cites packet switching and T1 multiplexing as two markets in which activity levels remain high. "But it is difficult to find stocks that capitalize on this," Schopick adds.

According to Schopick, Bolt Beranek & Newman, Inc. (NYSE—39) has performed well, benefiting from its niche in large government packet-switching systems. "Bolt Beranek has also done an outstanding job in developing products for artifical intelligence applications," says Robert Knight, managing director of Tower Capital Management.

Of all communications equipment stocks, Tower owns just two: Bolt Beranek and General Datacomm Industries, Inc. (NYSE—12⅝).

Ted Moreau, a vice-president with Robert Baird & Co., currently recommends General Datacomm because it represents a "good value priced at 13." Moreau estimates General Datacomm will earn 75 cents a share in fiscal 1986, ending Sept. 30, and $1.20 in fiscal 1987. Moreau says he believes General Datacomm's stock could trade at 20 times 1987 earnings if the company's quarterly results show particular strength in the second half of calendar 1986.

Other multiplexer manufacturers attracting attention are Timeplex, Inc. (NYSE—16¼), leader of the T1 multiplexer market; Infotron Systems Corp. (OTC—18); and Tellabs, Inc. (OTC—11⅝), multiplexer supplier to AT&T.

Daniel Zinsser, telecommunications analyst with Goldman, Sachs & Co., says he expects a recovery in Andrew Corp. (OTC—19¾), which traded at 40 approximately 14 months ago. Zinsser says Andrew's diversification into fiber optics, earth stations and cellular radios should more than counter slower growth in the company's traditional microwave antenna business.

Another recovery story could be Network Systems Corp. (OTC—12⅜), which experienced a 50% drop in its stock price in the past three months. According to Doug Whitman, telecommunications analyst with S. P. Warburg, Rowe, Pitman, Akroyd, Inc. of San Francisco, Network Systems represents a buying opportunity owing to strong management, promising new products and 71% gross margins. Gartner's Schopick says he believes there is "more value now in Network Systems' stock than has previously existed."

Few analysts find companies like Intecom, Inc. (OTC—4 9/16) attractive despite such low valuations. However, Whitman says Intecom is worth considering with its costs in line with mild growth expectations and its stock selling under one times revenue and below book value.

Investors remain selective with communications equipment stocks, and this may not change during the current stock hunting season.

*Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized research services for financial and high-tech firms.*

# MCI completes SBS acquisition

From page 134

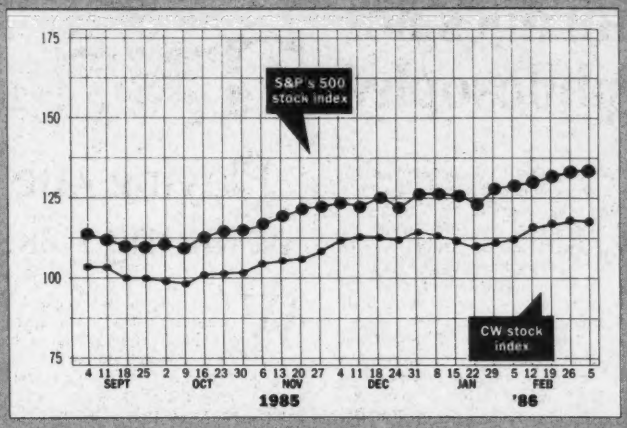
mary carrier for interagency traffic. More than $1 billion has been invested in McLean, Va.-based SBS by IBM, Aetna and Communications Satellite Corp.

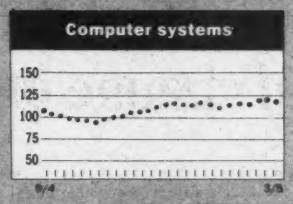
Aetna recognized a capital loss of $83.4 million in the second quarter of 1985 from the sale of its share of SBS. Aetna said the additional cash payment from IBM will be recorded as a capital gain in the first quarter of 1986.

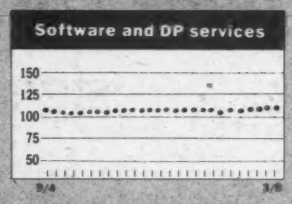
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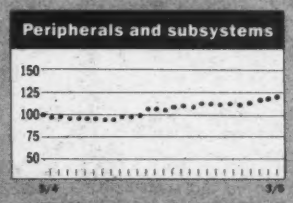
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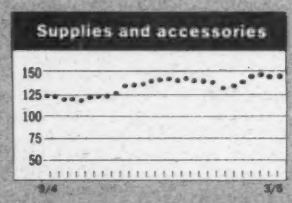
# Computerworld stock trading index

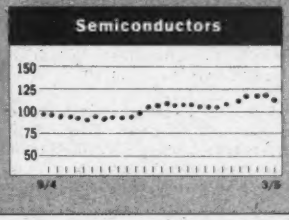


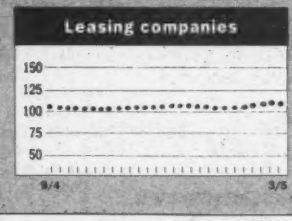




***All indexes reflect a historical base of 100 on Dec. 31, 1984, and trace stock market performance in relation to that base. The CW stock index represents the unweighted average performance of the six categories of computer industry stocks.***

| | 2/26/86 | 3/5/86 |
|---|---|---|
| Computer systems | 119.7 | **118.4** |
| Software and DP services | 104.5 | **104.5** |
| Peripherals and subsystems | 114.5 | **117.3** |
| Supplies and accessories | 144.4 | **145.4** |
| Semiconductors | 111.8 | **107.4** |
| Leasing companies | 103.5 | **103.4** |
| CW stock index | 116.4 | **116.1** |
| Standard and Poor's 500 stock index | 134.0 | **134.1** |

# Computerworld stock trading summary

CLOSING PRICES WEDNESDAY, MARCH 5, 1986

### COMPUTER SYSTEMS

| EXCH | | PRICE 52-WEEK RANGE (1) | | CLOSE MAR 5 1986 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| O | ALPHA MICROSYSTEMS | 5- | 9 | 5 7/8 | -1/8 | -2.0 |
| O | ALTOS COMPUTER SYST | 9- | 17 | 15 5/8 | -1 1/4 | -7.4 |
| A | AMDAHL CORP | 10- | 18 | 16 | -5/8 | -3.7 |
| O | APOLLO COMPUTER | 9- | 31 | 15 1/4 | -5/8 | -3.9 |
| O | APPLE COMPUTER INC | 14- | 31 | 25 1/4 | -3/4 | -2.8 |
| N | AT&T | 19- | 28 | 22 1/2 | +1/4 | +1.1 |
| N | BURROUGHS CORP | 52- | 71 | 65 3/8 | -4 7/0 | -6.9 |
| O | COMPAQ COMPUTER CP | 5- | 16 | 15 1/4 | -5/8 | -3.9 |
| O | COMPUTER AUTOMATION | 1- | 9 | 2 1/8 | -5/8 | -22.7 |
| A | COMPUTER CONSOLES | 5- | 14 | 6 3/8 | +5/8 | +10.8 |
| N | CONTROL DATA CORP | 15- | 39 | 22 5/8 | -1 1/2 | -6.2 |
| O | CONVERGENT TECHNOL | 5- | 13 | 11 | +3/8 | +3.5 |
| O | CPT CORP | 5- | 8 | 5 3/4 | -1/8 | -2.1 |
| N | CRAY RESEARCH INC | 25- | 72 | 70 1/4 | -1 1/2 | -2.0 |
| O | DAISY SYSTEMS CORP | 11- | 38 | 11 1/4 | -1/2 | -4.2 |
| N | DATA GENERAL CORP | 31- | 76 | 38 1/8 | -4 1/8 | -9.7 |
| N | DATAPOINT CORP | 5- | 22 | 5 3/8 | +1/8 | +2.3 |
| N | DIGITAL EQUIPMENT | 85- | 167 | 161 1/8 | -5 5/8 | -3.3 |
| A | EECO INC | 13- | 16 | 14 5/8 | +1/4 | +1.7 |
| N | ELECTRONIC ASSOC. | 3- | 6 | 4 7/8 | +1/2 | +11.4 |
| N | FLOATING POINT SYST | 18- | 37 | 32 5/8 | +1 5/8 | +5.2 |
| N | FOXBORO | 22- | 31 | 26 1/4 | +1 1/2 | +6.0 |
| N | GOULD INC | 20- | 38 | 28 1/8 | -5/8 | -2.1 |
| N | HARRIS CORP | 22- | 35 | 29 3/4 | -1 | -3.2 |
| N | HEWLETT-PACKARD CO | 29- | 43 | 41 1/4 | -1/2 | -1.1 |
| N | HONEYWELL INC | 54- | 87 | 73 7/8 | -4 1/2 | -5.7 |
| N | IBM | 117- | 158 | 148 3/8 | -9 7/8 | -6.2 |
| O | IPL SYSTEMS INC | 1- | 4 | 2 1/8 | +1/2 | +30.7 |
| N | ITT CORP | 28- | 44 | 43 1/8 | -7/8 | -1.9 |
| N | M/A-COM INC | 13- | 24 | 16 3/8 | +5/8 | +3.9 |
| N | MANAGEMENT ASSIST | 2- | 28 | 2 1/8 | 0 | 0.0 |
| N | MATSUSHITA ELEC(ADR) | 49- | 71 | 69 1/8 | +3 1/2 | +5.3 |
| O | MENTOR GRAPHICS | 13- | 30 | 15 | -2 1/8 | -12.4 |
| N | MODULAR COMPUTER SYS | 6- | 8 | 6 3/4 | +1/8 | +1.8 |
| N | MOHAWK DATA SCI | 1- | 13 | 2 1/4 | -1/8 | -5.2 |
| N | NBI INC | 11- | 20 | 13 | +3/4 | +6.1 |
| N | NCR | 25- | 46 | 41 1/2 | -2 3/8 | -5.4 |
| N | PERKIN-ELMER | 22- | 36 | 33 | -1 3/4 | -5.0 |
| N | PRIME COMPUTER INC | 15- | 27 | 24 1/4 | -1 5/8 | -6.2 |
| N | SPERRY CORP | 39- | 59 | 50 | -3 1/2 | -6.5 |
| O | STRATUS COMPUTER INC | 9- | 25 | 18 3/4 | -2 1/2 | -11.7 |
| O | TANDEM COMPUTERS INC | 13- | 29 | 25 1/8 | +1 1/4 | +5.2 |
| N | TANDY CORP | 24- | 42 | 40 7/8 | 0 | 0.0 |
| O | TELEVIDEO SYSTEMS | 2- | 4 | 3 7/8 | +1/8 | +3.3 |
| N | TELXON CORP | 10- | 27 | 26 | +1/4 | +0.9 |
| N | TEXAS INSTRUMENTS | 86- | 132 | 121 3/8 | -5 1/2 | -4.3 |
| A | ULTIMATE CORP | 8- | 32 | 32 | +1 1/8 | +6.2 |
| O | VECTOR GRAPHICS INC | 1- | 1 | 1/8 | 0 | 0.0 |
| A | WANG LABS "B" | 15- | 29 | 20 | -3/8 | -1.8 |
| A | WANG LABS "C" | 15- | 29 | 20 | -5/8 | -3.0 |
| N | XEROX CORP | 37- | 70 | 70 | +3/8 | +0.5 |

### SUPPLIES & ACCESSORIES

| EXCH | | PRICE 52-WEEK RANGE (1) | | CLOSE MAR 5 1986 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| N | AMERICAN BUS PRODS | 21- | 35 | 31 5/8 | +1 1/8 | +3.6 |
| N | BARRY WRIGHT | 17- | 29 | 20 5/0 | -5/8 | -2.9 |
| A | DUPLEX PRODUCTS INC | 13- | 22 | 20 | -1 1/8 | -5.3 |
| N | ENNIS BUS. FORMS | 14- | 26 | 25 7/8 | -1/2 | -1.8 |
| N | 3M COMPANY | 74- | 98 | 96 5/8 | +1 | +1.0 |
| N | MOORE CORP LTD | 15- | 24 | 24 1/4 | +1 3/4 | +7.7 |
| O | STANDARD REGISTER | 22- | 39 | 38 1/4 | +1 | +2.6 |
| N | WALLACE COMP SERVICE | 30- | 45 | 44 1/2 | +1/4 | +0.5 |

### SOFTWARE & DP SERVICES

| EXCH | | PRICE 52-WEEK RANGE (1) | | CLOSE MAR 5 1986 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 2- | 5 | 4 3/4 | +1/4 | +5.5 |
| N | ADVANCED SYSTEMS INC | 9- | 20 | 20 1/8 | +1/8 | +0.6 |
| N | AGS COMPUTERS INC | 10- | 25 | 22 3/4 | -3/4 | -3.1 |
| O | AMERICAN SOFTWARE | 9- | 15 | 9 | -1/8 | -1.3 |
| N | ANACOMP INC | 2- | 4 | 4 3/8 | 0 | 0.0 |
| O | ANALYSTS INTL CORP | 5- | 11 | 5 1/4 | 0 | 0.0 |
| O | ASHTON TATE | 6- | 23 | 20 7/8 | -2 1/8 | -9.2 |
| O | ASK COMPUTER SYSTEMS | 7- | 25 | 12 3/4 | -1 1/4 | -8.9 |
| B | ASTRADYNE COMP IND | 1- | 3 | 2 1/4 | +1/2 | +28.5 |
| N | AUTOMATIC DATA PROC | 35- | 66 | 65 1/2 | +3/8 | +0.5 |
| O | COMPUTER NETWORK | 5- | 9 | 5 1/4 | +1/8 | +2.4 |
| O | COMPUTER ASSOC INT'L | 18- | 37 | 34 3/4 | -2 1/4 | -6.0 |
| O | COMPUTER HORIZONS | 5- | 11 | 12 1/4 | 0 | 0.0 |
| N | COMPUTER SCIENCES | 13- | 36 | 35 | -7/8 | -2.4 |
| O | COMPUTER TASK GROUP | 10- | 26 | 26 | +1/2 | +1.9 |
| O | COMPUTER USAGE | 1- | 3 | 1 5/8 | 0 | 0.0 |
| O | COMPUTONE SYSTEMS | 4- | 11 | 4 | +1/8 | +3.2 |
| O | COMSERV CORP | 1- | 6 | 3 1/2 | 0 | 0.0 |
| O | COMSHARE | 7- | 12 | 10 3/4 | +1/8 | +1.1 |
| N | CULLINET SOFTWARE | 13- | 33 | 14 3/4 | +1/0 | +0.8 |
| O | CYCARE SYSTEMS INC | 19- | 27 | 23 3/4 | +1/4 | +1.0 |
| O | HOGAN SYSTEM INC | 4- | 12 | 7 5/8 | +1/8 | +1.6 |
| N | GENERAL ELECTRIC CO | 56- | 76 | 75 1/8 | -3/8 | -0.4 |
| N | GENL MOTORS E (EDS) | 20- | 47 | 42 5/8 | +3 3/4 | +9.6 |
| N | GTE CORP | 38- | 51 | 50 3/4 | +1 3/4 | +3.5 |
| O | INFORMATION SCIENCE | 1- | 5 | 2 1/2 | -1/2 | -16.6 |
| O | INFOTRON SYSTEMS CP | 13- | 24 | 17 3/4 | -1/4 | -1.3 |
| O | KEANE ASSOCIATES | 10- | 20 | 13 1/8 | +3/8 | +2.9 |
| N | LOGICON | 25- | 43 | 37 1/4 | +1/8 | +0.3 |
| O | LOTUS DEVELOPMENT CP | 15- | 34 | 23 1/2 | -1/2 | -2.0 |
| O | MCI COMMUNICATIONS | 7- | 13 | 12 1/4 | -5/8 | -4.8 |
| O | MNGT SCI AMER INC | 7- | 16 | 13 1/8 | +1/4 | +1.9 |
| O | MATHEMATICAL APP GRP | 1- | 8 | 1 7/8 | 0 | 0.0 |
| O | MICOM SYSTEMS INC | 12- | 35 | 15 3/4 | -3 1/4 | -17.1 |
| O | MICROPRO INT'L CP | 2- | 4 | 2 1/8 | | +3.0 |
| O | NATIONAL DATA CORP | 8- | 19 | 18 7/8 | 0 | 0.0 |
| O | ON-LINE SOFTWARE INT | 4- | 11 | 10 1/2 | +1/2 | +5.0 |
| N | PANSOPHIC SYSTEMS | 14- | 30 | 28 | -1 3/4 | -5.8 |
| N | PLANNING RESEARCH | 11- | 19 | 16 5/8 | +3/4 | +4.7 |
| O | POLICY MGMT SYSTS CP | 16- | 35 | 16 3/4 | +3/4 | +4.6 |
| O | PROGRAMMING & SYS | 4- | 9 | 8 1/2 | -1/2 | -5.5 |
| O | REYNOLDS & REYNOLD | 31- | 61 | 60 1/2 | +1/2 | +0.8 |
| O | SEI CORP | 13- | 27 | 25 3/4 | -1 | -3.7 |
| O | SHARED MEDICAL SYST | 26- | 37 | 36 5/8 | +1 1/2 | +4.2 |
| O | SCIENTIFIC COMPUTERS | 5- | 8 | 5 1/8 | 0 | 0.0 |
| O | SOFTWARE AG | 12- | 22 | 18 3/8 | 0 | 0.0 |
| N | URS CORP | 10- | 15 | 14 3/4 | +5/8 | +4.4 |
| N | UCCEL | 11- | 18 | 17 1/2 | -1/2 | -2.7 |
| O | VM SOFTWARE | 17- | 24 | 18 1/2 | -1 3/4 | -8.6 |

### SEMICONDUCTORS

| EXCH | | PRICE 52-WEEK RANGE (1) | | CLOSE MAR 5 1986 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| N | ADVANCED MICRO DEV | 22- | 36 | 30 3/8 | -7/8 | -2.7 |
| O | ADV'D SEMICONDUCTOR | 7- | 23 | 13 1/8 | -3/8 | -2.7 |
| N | ANALOG DEVICES INC | 18- | 31 | 29 1/8 | +5/8 | +2.1 |
| O | ANALOGIC CORP | 11- | 16 | 13 1/4 | -3/8 | -2.7 |
| N | APPLIED MAGNETICS CP | 9- | 18 | 18 1/8 | +1/8 | +0.6 |
| O | AVANTEK | 18- | 26 | 18 5/8 | -1 | -5.0 |
| O | HADCO CORP | 3- | 7 | 4 3/4 | -1/4 | -5.0 |
| O | INTEL CORP | 21- | 33 | 27 1/4 | -1 | -3.5 |
| O | MICRO MASK INC | 6- | 12 | 5 7/8 | -3/4 | -11.3 |
| N | MOTOROLA INC | 29- | 45 | 41 1/2 | -2 | -4.5 |
| N | NAT'L SEMICONDUCTOR | 10- | 15 | 13 5/8 | -5/8 | -4.3 |
| N | TERADYNE | 17- | 33 | 24 | -2 | -7.8 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 52-WEEK RANGE (1) | | CLOSE MAR 5 1986 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| P | AM INTERNATIONAL | 3- | 8 | 7 7/8 | +3/8 | +5.0 |
| A | ANDERSON JACOBSON | 2- | 5 | 2 1/4 | +1/8 | +5.8 |
| O | AST RESEARCH INC | 7- | 33 | 24 | -2 1/2 | -9.4 |
| O | AUTO-TROL TECHNOLOGY | 3- | 13 | 5 1/2 | -1/2 | -8.3 |
| O | AVANT-GARDE COMPUTNG | 3- | 21 | 4 3/4 | -1/4 | -5.0 |
| O | BANCTEC INC | 6- | 12 | 8 | +1/8 | +1.5 |
| O | BEEHIVE INT'L | 1- | 2 | 1/8 | 0 | 0.0 |
| N | BOLT,BERANEK & NEW | 20- | 39 | 38 3/4 | -1/4 | -0.6 |
| O | CAMBEX CORP | 1- | 3 | 1 3/4 | +3/8 | +33.2 |
| N | CENTRONICS DATA COMP | 3- | 11 | 5 1/8 | -3/8 | -6.8 |
| A | CETEC CORP | 6- | 9 | 8 1/4 | +1 | +13.7 |
| A | COGNITRONICS | 4- | 7 | 4 5/8 | +5/8 | +15.6 |
| N | COMPUGRAPHIC CORP | 23- | 36 | 25 3/8 | +1 5/8 | +6.8 |
| O | COMPUTER TRANSCEIVER | 0- | 1 | 5/8 | | -9.1 |
| N | COMPUTERVISION CORP | 9- | 44 | 16 | +1 1/2 | +10.3 |
| N | CONRAC CORP | 12- | 18 | 16 3/4 | +1/4 | +1.5 |
| A | DATAPRODUCTS CORP | 11- | 20 | 15 5/8 | +1/8 | +0.8 |
| A | DATARAM CORP | 4- | 12 | 11 1/4 | -5/8 | -5.2 |
| O | DATA SWITCH CORP | 4- | 9 | 6 | +3/4 | +14.2 |
| O | DATUM INC | 5- | 9 | 5 5/8 | +1/2 | +9.7 |
| O | DECISION DATA COMPUT | 10- | 20 | 10 3/4 | +3/4 | +7.5 |
| O | ENDATA, INC | 2- | 8 | 5 1/2 | -3/8 | -6.3 |
| O | EVANS & SUTHERLAND | 12- | 24 | 24 1/4 | +1 | +4.3 |
| O | GANDALF TECHNOLOGIES | 5- | 13 | 5 3/4 | -5/8 | -9.8 |
| N | GEN'L DATA COMM IND | 8- | 21 | 11 3/8 | -3/4 | -6.1 |
| N | HAZELTINE CORP | 20- | 30 | 20 3/4 | +1 1/8 | +5.7 |
| O | ICOT CORP | 3- | 11 | 10 3/4 | 0 | 0.0 |
| O | INFORMATION INTL INC | 10- | 17 | 13 1/8 | -1/8 | -0.9 |
| O | INTECOM INC | 4- | 11 | 5 | +5/8 | +14.2 |
| A | LUNDY ELECTRONICS | 10- | 15 | 14 1/8 | -1/4 | -1.7 |
| O | MEGADATA CORP | 3- | 8 | 3 1/4 | -1/8 | -5.4 |
| A | MSI DATA CORP | 7- | 13 | 11 7/0 | 0 | 0.0 |
| N | NASHUA CORP | 24- | 39 | 39 3/8 | +5/8 | +1.6 |
| O | NETWORK SYSTEMS CORP | 11- | 27 | 11 1/2 | +1/4 | +2.2 |
| N | NO AMERICAN PHILIPS | 32- | 45 | 43 5/8 | +1 1/8 | +2.6 |
| N | NORTHERN TELECOM LTD | 26- | 41 | 27 5/8 | -1/2 | -1.7 |
| O | OMEX | 1- | 3 | 1/2 | 0 | 0.0 |
| N | PARADYNE CORP | 6- | 18 | 8 1/8 | +1 1/8 | +16.0 |
| A | PENRIL CORP | 7- | 14 | 8 1/8 | -1/8 | -1.5 |
| N | PLESSEY CO (ADR) | 19- | 30 | 30 1/4 | +3/4 | +2.5 |
| O | PRINTRONIX INC | 9- | 18 | 12 5/8 | -1/2 | -3.8 |
| O | QMS INC | 6- | 16 | 11 1/2 | +1 1/8 | +10.8 |
| O | RAMTEK CORP | 2- | 7 | 3 1/4 | -1/4 | -7.1 |
| N | RECOGNITION EQUIP | 9- | 17 | 14 1/4 | +5/8 | +4.5 |
| N | SANDERS ASSOCIATES | 30- | 44 | 41 3/4 | +1 1/4 | +3.0 |
| O | SCAN-TRON CORP | 9- | 19 | 17 3/4 | -1 | -5.3 |
| N | SCIENTIFIC ATLANTA | 10- | 15 | 13 7/0 | -1/8 | -0.8 |
| O | SEAGATE TECHNOLOGY | 5- | 11 | 10 5/8 | +1 1/8 | +11.8 |
| N | STORAGE TECHNOLOGY | 1- | 5 | 4 1/2 | +1 1/4 | +38.4 |
| O | SYKES DATATRONICS | 0- | 2 | 3/8 | 0 | 0.0 |
| A | T BAR INC | 5- | 9 | 6 | +1/2 | +9.0 |
| A | TAB PRODUCTS CO | 14- | 21 | 20 1/4 | -1/0 | -0.6 |
| O | TANDON CORP | 3- | 9 | 6 | +3/8 | +6.6 |
| A | TEC INC | 6- | 13 | 6 1/2 | +5/8 | +10.6 |
| N | TEKTRONIX INC | 47- | 68 | 60 3/4 | -2 3/8 | -3.7 |
| N | TELEX | 34- | 68 | 63 1/2 | -4 1/8 | -6.0 |
| O | TESDATA SYSTEMS CP | 0- | 3 | 3/4 | 0 | 0.0 |
| N | TIMEPLEX INC | 15- | 23 | 15 1/2 | -1 | -6.0 |
| N | TITAN CORP | 4- | 11 | 10 3/8 | -1/2 | -4.5 |
| O | VISUAL TECHNOLOGY | 1- | 3 | 3/4 | | -7.0 |

### LEASING COMPANIES

| EXCH | | PRICE 52-WEEK RANGE (1) | | CLOSE MAR 5 1986 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|---|
| N | COMDISCO INC | 10- | 29 | 28 1/4 | -1/8 | -0.4 |
| N | CONTINENTAL INFO SYS | 5- | 19 | 18 1/2 | +1/2 | +2.7 |
| O | FINALCO GROUP INC | 4- | 5 | 4 1/2 | 0 | 0.0 |
| O | PHOENIX AMERICAN INC | 2- | 4 | 3 3/4 | -1/8 | -3.2 |
| O | SELECTERM INC | 7- | 12 | 9 1/2 | 0 | 0.0 |
| N | U.S. LEASING | 32- | 43 | 38 5/8 | 0 | 0.0 |

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Source: Trade Quotes, Inc.

# COMPUTER INDUSTRY

## INSIDE

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## INSTANT ANALYSIS

*"[IBM should have] a year of orderly progression in shipments and relatively smooth year-over-year revenue and earnings-per-share comparisons. . . . We continue to recommend purchase."*

**— Frederic Cohen and Walter Winnitzki, L. F. Rothschild, Unterberg Towbin**

# HP says Spectrum does not signal change in philosophy

**By James Connolly**

Hewlett-Packard Co.'s announcement of its next generation of minicomputers, two systems based on reduced instruction set computer (RISC) technology, was generally well received by analysts and users two weeks ago.

But while the computers themselves may have been praised, speculation remains as to how soon the product line — which is code-named Spectrum and will not be delivered until at least late this year — will help HP's revenue and market share. Speculation also remains about the long-term impact that the project will have on HP's organization.



HP's Dean O. Morton

HP, which relied on a decentralized business group approach for most of its first 47 years in business, tried a reorganization under Chief Executive Officer John A. Young to produce Spectrum. The effort involved more than 1,000 people working on the core development project and 3,000 other employees working on various aspects. To manage that effort, HP brought all Spectrum research and development out of six independent divisions and under the newly formed Information Technology Group (ITG).

HP Chief Operating Officer Dean O. Morton said in an interview that the centralization of the Spectrum effort does not signal a permanent change for HP. "It was just a pragmatic response," Morton said. "Actually, it does not represent a philosophical change as such. But it was the way we felt was necessary to approach the development.

"I think large projects require large teams," he continued. "When you have something that is highly systems oriented

See **SPECTRUM** page 108

# Zenith wins military contract

## Hopes federal awards will stimulate commercial sales

**By Rosemary Hamilton**

GLENVIEW, Ill. — With its recently awarded government contracts that total more than $270 million, Zenith Data Systems Corp. has become even more dependent on military sales than it has traditionally been. Nonetheless, the IBM Personal Computer-compatible maker, a subsidiary of Zenith Electronics Corp., expects the contracts to give it a new appeal in the commercial market.

"Our commercial sales have been steady but never as dramatic as our government contracts," said Patrick Gallagher, a sales manager in Zenith's federal division. "But since last week, the commercial organizations are coming out of the woodwork inquiring about Zenith."

Zenith, which announced its surprise victory with the highly publicized $27 million Internal Revenue Service portable computer contract late last month [CW, March 3], won another federal contract in the same week worth up to $242 million. Zenith will supply approximately 90,000 units of its IBM PC AT-compatible microcomputers to the U.S. Air Force, Army, Navy and Marine Corps, as well as to other agencies of the Department of Defense, over a three-year period.

"In my perspective, Zenith has never been a viable alternative in the commerical market," said Steven Newman, a senior consultant with International Resource Development, Inc. in Norwalk, Conn. "The splash they've made with these contracts could certainly help. But they're the ones that have to do something about it. If they don't capitalize on it in the next month or

See **ZENITH** page 132

**INDUSTRY INSIGHT**
Edward Warner

# Playing safe & taking risks

Within the past two weeks, two major industry players have unveiled products that each says is a reflection of their company's long-range plans. While both products boast enough technical sophistication to make such a claim feasible, it is also that level of technical sophistication that sets them apart.

Compaq Computer Corp.'s Portable II is a no-risk, smaller and lighter version of the company's Portable 286 transportable personal computer. Like all of the machines in the Compaq line, the Portable II is IBM compatible — a conservative approach in itself — and relies on a tried-and-proven microprocessor, the Intel Corp. 80286.

Compaq says machines of this ilk will constitute the bulk of its product line in years to come, which probably means that Compaq has chosen to emphasize 80286-based, lightweight portables.

Hewlett-Packard Co., on the other hand, has not opted for such a no-risk approach. With its introduction of two minicomputers based on reduced instruction set computing (RISC) architecture, the Palo Alto, Calif.-based vendor effectively "bet its whole future" on the business user's acceptance of RISC, according to one analyst. What makes this so chancy is RISC's failure so far to gain acceptance in the office, although the RISC architecture has seen some use in engineering applications to date.

HP has nonetheless cast its lot with RISC and says that eventually all of its

See **PLAYING** page 106

*Warner is editor for the Computerworld News Service.*

# MCI completes acquisition of Satellite Business Systems

## Union expected to benefit both parties

**By Stanley Gibson**

WASHINGTON, D.C. — Completing a landmark telecommunications merger that is expected to benefit both companies, MCI Communications Corp. last week announced it had acquired Satellite Business Systems (SBS) from IBM for approximately 47 million shares, or 16.6% of MCI common stock. The Federal Communications Commission approved the transfer Feb. 14.

In June 1985, IBM announced it would acquire the interest of Aetna Life and Casualty Co. in SBS for an undisclosed amount and assume SBS' indebtedness. The IBM-Aetna agreement called for a further payment to Aetna based on the market value of MCI stock at the time of completion of the MCI-SBS merger. That payment was announced last week to be $68.5 million.

The union with MCI should solve some problems for SBS, said Fritz Ringling, an analyst for the Gartner Group, Inc. in Stamford, Conn. But he predicted that MCI probably will not realize profits from SBS operations until 1987. SBS has lost some $500 million since it began aggressively marketing its services in 1980.

"SBS was killed before because it couldn't handle small companies with small volumes of business. They lost money on short-haul, long-distance traffic," Ringling said. Previously, SBS had to pay local access charges to AT&T, but now SBS will use MCI's lines at no charge. SBS has been leasing between 30,000 to 50,000 lines from AT&T, but since the announcement of the merger last June, SBS had been gradually switching from AT&T to MCI lines, MCI spokesman John Houser said.

Begun as a business communications company, SBS had also been offering its SBS Skyline service to residential customers in an effort to generate greater volume of usage. Now, SBS will transfer many of its private customers to MCI's lines, and MCI will transfer some of its business users to SBS' satellite network.

MCI will use the three satellites of the SBS network for data transmission, teleconferencing and as a backup system for its ground telephone network. Residential SBS customers, meanwhile, will not notice any change in service, Houser said, except for a possibly improved connection resulting from the use of MCI's terrestrial network.

In addition to enabling SBS to serve small customers better, MCI should benefit from gaining access to SBS' large-customer base, Ringling said. MCI recently launched a marketing campaign targeting major business users to capitalize on its affiliation with IBM by stressing the image of quality that IBM enjoys.

Houser said some SBS employees will be absorbed by MCI and IBM, reducing SBS' costs further.

IBM said it will use SBS as its pri-

See **MCI** page 132

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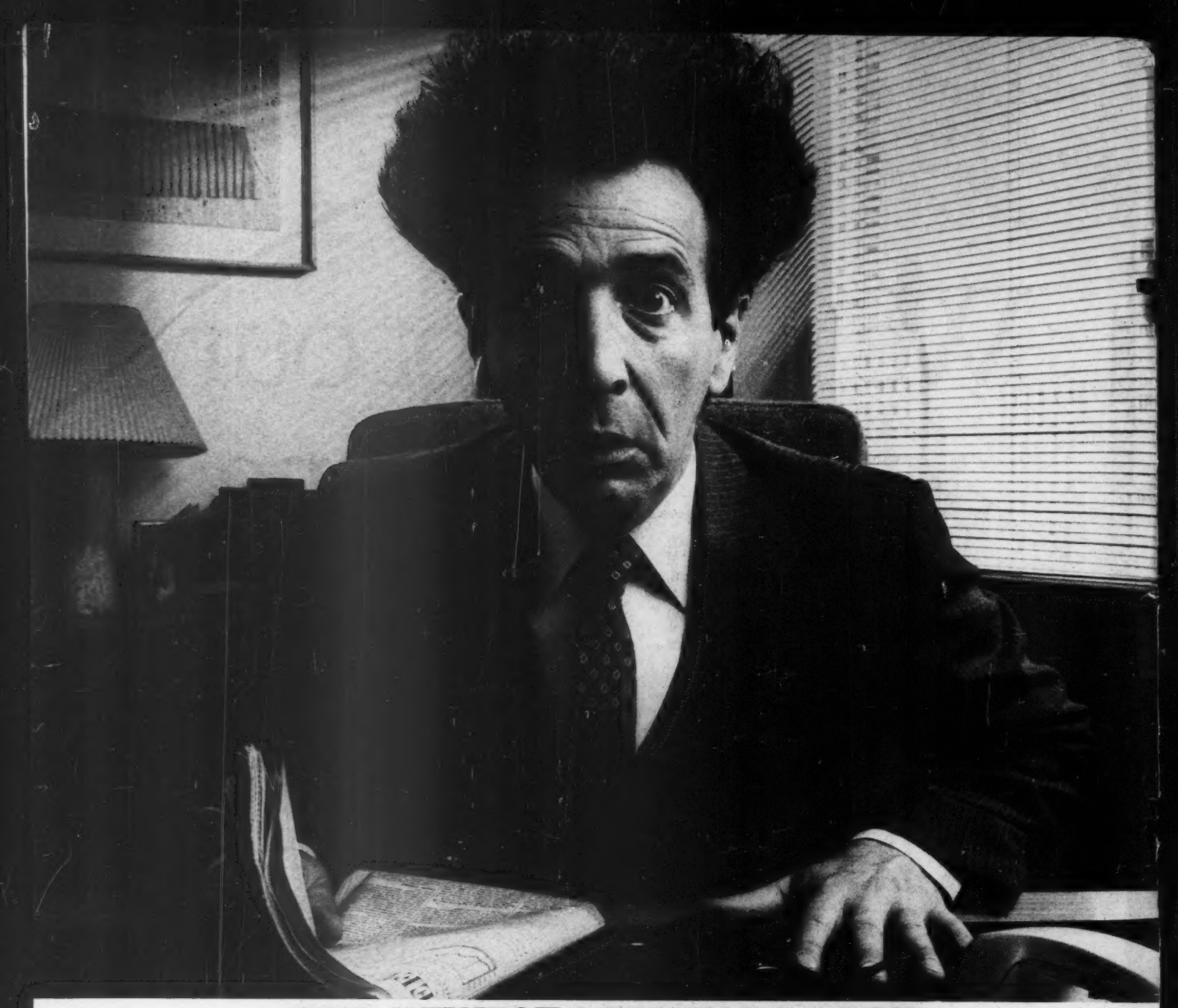
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